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Smoke Investigation Bulletin No. 2

Bibliography of Smoke and Smoke Prevention

Compiled by

Ellwood H. McClelland

Technology Librarian, Carnegie Library of Pittsburgh

University of Pittsburgh
Pittsburgh, Pa.

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Introduction

The present compilation is based on a bibliography of Smoke and Smoke Prevention published by the Carnegie Library of Pittsburgh in its "Monthly Bulletin" of May, 1907. Most of the work has been done in the Technology Department of this Library, where all references marked with the asterisk may be consulted. The list deals mainly with coal smoke and does not include the literature of dust, metallurgical fumes, fuels, firing, and other subjects more or less directly related to the suppression of smoke.

Titles and quotations are given as in the original, regardless of variations in spelling. Each reference gives the date of publication, shows the extent and method of illustration, and indicates the length of the article, either in words or by inclusive paging. Titles and sources are given in full. In identifying the sources of certain official publications of Great Britain, use has been made of the symbols given in the various General Indexes to the Bills, Reports, Estimates, Accounts and Papers, published by the House of Commons. Some original references which could not be personally examined are referred to informally in the annotations to reprints or abstracts, but the compiler does not assume responsibility for the accuracy of these citations. The style is that generally followed in library catalogues, initial capitals being used in names of organizations, but not in titles of articles or journals or in German nouns.

A thoroughly satisfactory classification is impossible, since only a relatively small number of the articles deal definitely with specific problems.

Mr. Walter C. Holmes has given considerable assistance in compilation, and Miss Irene Stewart and Miss Elva Smith in proofreading.

E. H. McC.

5 June, 1913

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Abbreviations Used

apx.	appendix
c.	copyright
col.	column or columns
comp.	compiler
diag.	diagram or diagrams
dr.	drawing or drawings
ed.	edition
ill.	illustration or illustrations
n. d.	no date
n. s.	new series
p.	page or pages
pl.	plate or plates
pt.	part or parts
pub.	publisher
sec.	section
v.	volume or volumes
w.	words
. . .	indicates omission of words
*	indicates an article in the Carnegie Library of Pittsburgh

Bibliography

Only the more important bibliographies are grouped here. Many others appear throughout the list.

***Crane,** Walter Richard, *comp.*
Index of mining literature; comprising an index of mining, metallurgical, civil, mechanical, electrical and chemical engineering subjects as related to mining engineering. v. 1-2, 1909-1912. Wiley.
"Smoke problem: flue dust, fume, bog houses, chimneys, etc." v. 2, p. 342-343. 28 references, a few of which deal with coal smoke.

***Engineering index,** v. 1-date, 1884-date.
Smoke prevention, v. 1 (1884-1891), p. 380; v. 2 (1892-1895), p. 383-384; v. 3 (1896-1900), p. 848-850; v. 4 (1901-1905), p. 1005-1006; v. 5 (1906), p. 254-255; v. 6 (1907), p. 279-280; v. 7 (1908), p. 271; v. 8 (1909), p. 305-306; v. 9 (1910), p. 324; v. 10 (1911), p. 332-333; v. 11 (1912), p. 76, 356.
This index appears monthly in "Engineering magazine" and cumulates annually. Indexes contents of about 200 journals. The volumes mentioned above (1884-1912) contain about 190 references dealing mainly with mechanical engineering features of smoke prevention.

***Frazer,** Persifor.
Bibliography of injuries to vegetation by furnace-gases, 1907. (In Transactions of the American Institute of Mining Engineers, v. 38, p. 520-555.)
Summaries and synopses of treatises arranged in chronological order to accompany author's paper, "A search for the causes of injury to vegetation," etc. Forty-eight references, with excellent abstracts.

***General** index to Engineering news. April, 1874-1909. 4 v.
Smoke prevention, v. 2 (1890-1899), p. 242-243; v. 3 (1900-1904), p. 212; v. 4 (1905-1909), p. 246.
About 35 references to articles and notes in "Engineering news," covering mechanical, economic, hygienic and legal problems.

***General** index to the transactions and journal of the Sanitary Institute, v. 1-21, including also three volumes of miscellaneous papers. 1876-1900.
"Smoke abatement," etc. p. 194-195. (About 75 references.)

***Hamor,** W. A.
Index to the literature of the action of noxious gases on vegetation. 1909. (In Mineral industry, 1908, v. 17, p. 901-918.)
Valuable list of 283 references, classed as "Books," and "Papers in periodicals, general," with chronological arrangement in each class, and a name index. Gives a few annotations. Prepared in connection with paper by Chas. Baskerville.
"An attempt has been made to prepare a complete bibliography of the injurious effects of smoke and noxious gases on plant life."

***Haselhoff,** Emil, & **Lindau,** G..
Zusammenstellung der wichtigsten arbeiten über rauchbeschädigungen. [6 p.] 1903. (In their "Die beschädigung der vegetation durch rauch," p. 395-400.)

***Hays,** Joseph Weller.
"Authorities cited" (1906. In his "Combustion and smokeless furnaces." (p. v-vi.)
Concerned mainly with mechanical methods of smoke prevention.

***International** catalogue of scientific literature; published for the International Council by the Royal Society of London. 1st annual issue-date. 1902-date.

F. Meteorology. 0375: Apparatus for measuring impurities in the atmosphere. 0420: Impurities and dust in the atmosphere.

M. Botany. 4150: Diseases due to other causes.

Q. Physiology. 6024: Impurities in the air.

Exhaustive catalogue, indexing books, papers and theses. The annual volumes under the classification indicated above give numerous references to smoke and its effects.

***Liefmann,** H.

"Literatur." 1908. (In his "Über die rauch- und russfrage insbesondere vom gesundheitlichen standpunkte und eine methode des russnachweises in der luft.," p. 74-90.)

Classified list of 229 references.

***London, Times**; daily.

—Monthly index cumulated annually to form the Annual index. 1906-date.

—Quarterly index, published by Samuel Palmer. v. 31-date. 1871-date.

Contains many references to smoke and smoke abatement in files of the "Times."

***Mining** world index of current literature. v. 1-date. 1912-date.

Semi-annual cumulation of weekly index in "Mining and engineering world." The periodical literature of 1912 is covered by v. 1-2.

"Fumes, dust and gas," v. 1, p. 260-261, 293; v. 2, p. 184-185, 213.

***Partial** bibliography of the subject of smokeless combustion. 1911. (In Proceedings of the Engineers' Society of Western Pennsylvania, v. 27, p. 462-464.)

Seventeen annotated references, furnished by Technology Department of the Carnegie Library of Pittsburgh, in connection with paper by Mirabeau Sims.

***Pittsburgh**—Carnegie Library.

Smoke prevention; references to books and magazine articles. 20 p. 1907. Carnegie Library of Pittsburgh.

**The same.* (In Monthly bulletin of the Carnegie Library of Pittsburgh, May, 1907, v. 12, p. 195-212.)

Annotated list dealing largely with mechanical methods of smoke prevention, with less attention to effects of smoke. About 200 references, all of which are in this Library.

***Ramsay,** Alexander, *comp.*

Bibliography; guide and index to climate. 449 p. 1884. Sonnenschein.

Abstracts and indexes a large amount of material, on air, aqueous vapor, clearness, clouds and fogs, the last topic including material on smoke. See index.

***Repertorium** der technischen literatur, 1823-1908. v. 1-21. 1856-1909.

v. 5-21 (prepared by "Kaiserliches patentamt" of Germany), title reads "Repertorium der technischen journal-literatur."

Superseded in 1909 by "Fortschritte der technik" and later by "Engineering abstracts."

Indexes more than 400 journals. "Sachregister" in each annual volume, indexes articles on smoke problem under subject headings in French, German and English.

***Technical** press index. January, 1908-June, 1909.

"Smoke prevention," etc., p. 90, 228, 229, 234, 237, 240, 349. (See index.)

***United States**—Department of Agriculture. Library.

Catalogue of publications relating to forestry in the Library of the United States Department of Agriculture. 302 p. 1912. Bulletin 76.

"Forest protection, Smoke," p. 184. (Ten references.)

***United States**—Surgeon-General's office.

Index catalogue of the library; authors and subjects.

"Smoke." 1892. 1st series, v. 13, p. 226-227; 1911. 2nd series, v. 16, p. 78-80.

Index to papers in medical and scientific journals. Titles given briefly. No notes.

***Zeitschrift** des Vereines deutscher Ingenieure, "Inhaltsverzeichnis." v. 1-54. 1857-1910.

Index to v. 1-5 is in v. 5; to v. 11-15 is in v. 15, to v. 16-54 is published separately in four parts.

Patents

***England**—Patent office.

Abridgments of specifications. Class 51, pt. 1. Furnaces and kilns, [including blowpipes and blowpipe burners; smith's forges and rivet heaters; smoke and fumes, treating.] 1855-1908.

The abridgments for 1855-1908 include more than 3,000 patents on smoke prevention and consumption. Illustrated.

**The same, old series, unillustrated.* 1617-1883. Class 30; Preparation &c. of fuel. Class 49; Steam engines.

***Germany**—Kaiserliches patentamt.

Auszüge aus den patentschriften. [weekly.] v. 1-date. 1880-date. Classes 12 e, 24.

Class 12 e: Absorbing and purifying gases and vapors, mixing solid or fluid bodies as well as gases and vapors.
Class 24: Furnaces.
The same system of classification applies to the patents of Denmark, Norway, and Austria.

United States—Patent office.

[Patent specifications.] Classified.

Class 75: Metallurgy.
  Subclass 30: Fume arresters.

Class 110: Furnaces.
  Subclass 142: Spark arresters, Stack, steam or water spray.
  Subclass 143: Spark arresters, Stack, water-receptacle.
  Subclass 144: Spark arresters, Water-receptacle.
  Subclass 145: Spark and smoke conductors.
  Subclass 183: Smoke purifiers.

At the end of the year 1912, subclass 183 contained 93 patents.

**The same, unclassified.* In Specifications and drawings of patents issued . . . May 30, 1871-June, 1911. [v. 1-525.]

See Annual index to the Official gazette, also Subject-matter index for inventions issued by the United States Patent Office from 1790 to 1873, v. 3, p. 1369.

History

***History** and working of the Alkali Acts of 1863 and 1874. 1878. (In Chemical news, v. 38, p. 158-160.)

Reviews extent and working of early English legislation regarding noxious fumes.

See also letter, p. 172-173.

***Jerome,** Edward S.

A bit of New England history. 2 p. n. d.

Typewritten copy. Notes on Hatfield, Mass., which prohibited railroad construction within two miles of the town as a safegaurd against the smoke nuisance.

***O'Connor,** John, *jr.*

History of the smoke nuisance and of smoke abatement in Pittsburgh. 4 p. 1913.

**The same.* 1913. (In Industrial world, v. 92, n. s. v. 47, pt. 1, p. 352-354.)

"Bibliography," p. 355. (Nine references.)

Author is (1913) Economist, Smoke Investigation Staff, Department of Industrial Research, University of Pittsburgh, and Secretary of the Smoke and Dust Abatement League of Pittsburgh.

Excellent historical sketch of Pittsburgh's smoke problem, and attempts at dealing with it.

***Ost,** H.

Der Kampf gegen schädliche industriegase. 1907. (In Zeitschrift für angewandte chemie, v. 20, pt. 2, p. 1689-1693.)

The same, abstract, 75 w. 1908. (In Jahresbericht der Vereinigung für Angewandte Botanik, v. 6, p. 89.)

Historical résumé, dealing mainly with campaign in England and Germany.

***Pollock,** W. F.

Smoke prevention. 4,800 w. 1881. (In Nineteenth century, v. 9, p. 478.)

History of the smoke nuisance and review of literature on the subject.

***Rauchschwache** feuerung von James Watt. 200 w. 1 dr. 1912. (In Rauch und staub, v. 2, p. 170.)

Abstract from "Schweizerische bauzeitung," 1911, no. 19-21.

Illustrated description of furnace designed by Watt, calling attention to early attempts at smoke prevention.

***Vogel,** Otto.

Aeltere und neuere verfahren zur unshädlichmachung des hüttenrauches durch abscheidung des schwefels aus seinen oxydationsprodukten. 3 dr. 1912. (In Rauch und staub, v. 3, p. 68-70.)

Synopsis with foot-note references to original articles.

***Vogel,** Otto.

Rauchbekämpfung in alter zeit. 3 ill. 1912. (In Rauch und staub, v. 2, p. 198-202.)

History, with foot-note references.

***Vogel,** Otto.

Rauchbelästigung in alter zeit. 1912. (In Rauch und staub, v. 2, p. 118-120.)

Early history of smoke abatement in Europe. Foot-note references.

***Vogel, Otto.**

Steinkohlenrauch, rauchbelästigung und rauchschäden. 1896. (In Prometheus, v. 7, p. 369-372, 385-388.)

Gives much space to history of smoke problem. Considers harmful effects of smoke on vegetation.

***Young, Charles F. T.**

On the use of coal in furnaces without smoke. 16 dr. 1863. (In Transactions of the Society of Engineers, 1862. p. 66-98.)

Largely historical, illustrating and describing briefly the more important devices for smoke prevention up to this date. (1862.)

Serial Publications

***Coal Smoke Abatement Society.**

Annual report, balance sheet, and list of subscribers. 1-13. 1899-1911.

1899, 12 p. 1900, 12 p. 1901, 23 p. 1902, 17 p. 1903, 14 p. 1904, 15 p. 1905, 20 p. 1906, 20 p. 1907, 21 p. 1908, 20 p. 1909, 20 p. 1910, 18 p. 1911, 18 p.
No technical information, but valuable as outlining progress of movement in England.

Coal Smoke Abatement Society.

[Publications.] (List as furnished by the Society, 1913.)
* Reports, 1899-1912.
English law relating to the emission of smoke from chimneys, by Joseph Hurst.
Reports of tests of domestic grates, ser. 1-3.
Report of test of gas fires.
London smoke and fog, by Rollo Russell.
* Papers read at Smoke Abatement Conference, 1905.
* Papers read at International Conference, 1912.
Paper read at Sanitary Institute Conference on returns furnished by local authorities as to the methods adopted in dealing with the abatement of smoke nuisances.
"Replies furnished by manufacturers," paper by S. Rideal.
Aims and objects of the Hamburg Smoke Abatement Society.
Lectures on "Training and work of stokers," by W. H. Booth.
Ten years' work by the Coal Smoke Abatement Society, by H. A. Des Vœux.
Duties of local authorities in dealing with smoke abatement, by L. W. Chubb.
* Set of papers read at Sheffield Conference.
* Set of papers read at Manchester Conference, 1911.
* Smoke abatement, paper by L. W. Chubb before Institute of Sanitary Engineers.
Sootfall of London.

***Industrial** world (Pittsburgh).

Annual smoke prevention review number. 121-160 p. 3 Feb., 1913.

First annual number. Summarizes conditions in many American cities. Data chiefly from official sources.

Manchester and Salford Noxious Vapours Abatement Association.
Air pollution lectures; 1st-4th ser. 1887-1893.

First series: *Noxious Vapours which pollute the air, by J. C. Bell.—*Pure air and how to obtain it, by A. Ransome.—*A piece of coal and what becomes of it, by G. E. Davis.—*Why the air of Manchester is so impure, by C. Estcourt.—*Physical effects of air pollution, by C. G. K. Gillespie.

Second series: Present legislation on noxious vapours, with suggested improvements, by A. C. Fletcher.—*Pollution of the air as affecting the architect and his work, by J. Holden.—Pollution of air as affecting health, by H. Simpson.—Pollution of air as affecting plant life, by Robert Holland.—*Some common sources of air pollution, by William Thompson.—The smoke nuisance, by H. Fletcher.

Third series: *Flame and smoke, by T. Fletcher.—On the use of various gases in engines, by W. J. Crossley.—The work of the Committee for Testing Smoke Preventing appliances, by H. Fletcher.—Enforcement of the law relating to smoke by private individuals, by T. Patterson.—*The nuisance of domestic fire smoke, and methods of abating it, by T. C. Horsfall.—The prospect of pure air in the immediate future for large towns, by C. Estcourt.

Fourth series: Pollution of the air by waste products from chemical works, by J. C. Bell.—Electricity as a substitute for steam power, by J. Johnston.—The extent and character of air pollution in Manchester and Salford, as shown by analyses of rainwater, by William Thomson.—*Some considerations of the effects of air pollution on health, by A. E. Pownall.—The law relating to air pollution with proposals for its abatement, by E. A. Parry.

Non-technical pamphlets. Later ones have separate pagination. Above list of lectures "published," appears on cover of lecture No. 4, ser. 4 [1893], though at that time some of the lectures were still unpublished.

***Rauch** und staub; zeitschrift für ihre bekämpfung. v. 1-date. Oct. 1910-date.

Edited by Dr. Aufhauser in Hamburg; published by A. Bagel in Düsseldorf.

Monthly journal with many original papers, abstracts of periodical literature, and reviews of books dealing with suppression of smoke and dust nuisance.

***Wislicenus,** Hans, *ed.*
Sammlung von abhandlungen über abgase und rauchschäden.

1. Über die grundlagen technischer und gesetzlicher massnahmen gegen rauchschäden, by H. Wislicenus. 80 p. 1908.
2. Die rauchquellen im Königreiche Sachsen und ihr einfluss auf die forstwirtschaft, by E. Schröter. 219 p. 3 maps. 1908.
3. Die ermittelung des säuregehaltes der luft in der umgebung von rauchquellen und der nachweis seines ursprungs, by C. Gerlach. 29 p. 4 dr. 1909.
4. Zwei denkschriften über luftrecht dem ausschuss des bundes der industriellen in Berlin für das studium der errichtung einer gewerblich-technischen reichsbehörde mit benutzung der ergebnisse der vom ausschuss veranstalteten umfrage, by K. W. Jurisch. 40 p. 1910.
5. Beiträge zur ermittelung des holzmassenverlustes infolge von rauchschäden, by C. Gerlach. 81 p. 7 diag. 1910.
6. Erfahrungen und anschauungen über rauchschäden im walde und deren bekämpfung, by Th. Grohmann. 44 p. 23 ill. 1910.

Combustion of Coal. Formation of Smoke

***Breckenridge,** Lester P.
Study of four hundred steaming tests made at the fuel-testing plant, St. Louis, Mo., in 1904, 1905 and 1906. 196 p. ill. 1907. (United States Geological Survey. Bulletin No. 325.)

"Bibliography," p. 179.

Tests were of the evaporative performance of boilers with different coals, etc.

***Breckenridge,** Lester P., **Kreisinger,** Henry, & **Ray,** W. T.
Steaming tests of coals and related investigations, September 1, 1904, to December 31, 1908. 380 p. 94 fig. 2 pl. 22 tables. 1912. (United States—Bureau of Mines, Bulletin 23.)

"Hughes smoke preventer," p. 20. "Density of Smoke," p. 40, 45. "Relation of smoke to the chemical composition of coal and the results of tests," p. 269-270.

Suggests the following as causes of smoke: high rate of combustion with deficient air supply caused by thick fuel bed, and high volatile matter with accompanying high percentage of ash and moisture. General object of tests was to determine fuel value of coals and lignite of the United States.

***Davis, George E.**
A piece of coal and what becomes of it. 27-38 p. 1887. (Manchester and Salford Noxious Vapours Abatement Association, Lectures on air pollution, No. 3.)

Brief history of coal and of smoke abatement, principles of combustion, loss of fuel, and pollution of air by imperfect combustion.

***Dimond,** E. W.
Chemistry of combustion applied to the economy of fuel with special reference to the construction of fire chambers for steam boilers. 162 p. Ill. 1867.

Pt. 1, Substances employed and principles involved in combustion; pt. 2, Application of chemical principles to the construction of furnaces.
Discusses principles of combustion, calorific power of fuels and loss due to imperfect combustion. Many diagrams in color, showing graphically author's ideas of chemical union and combustion.

***Dosch,** A.
Abhängigkeit des rauchgasvolumens von der erzeugten wärmemenge und ihre anwendung. 1904. (In Zeitschrift des Österreichischen Ingenieur- und Architekten-Vereines, v. 56, pt. 2, p. 654-657, 666-670.)

***Fischer,** Ferd.
Über rauch, dessen bildung, verhütung und beseitigung. 1889. (In Zeitschrift für angewandte chemie, v. 2, p. 9-12, 68-70, 213-216.)

History and theoretical study of smoke production and smoke prevention are given most consideration. Includes comprehensive table of distillation products of coal, with temperatures at which they volatilize.

***Fletcher,** Thomas.
Flame and smoke. 14 p. 1889. (Manchester and Salford Noxious Vapours Abatement Association. Lectures on air pollution, ser. 3, No. 1.)

Discusses causes and effects of coal smoke, and urges use of coal gas as fuel.

***Frankland,** E.
Smoke abatement; report of the Committee of the Smoke Abatement Exhibition. 1883. (In Nature, v. 27, p. 407-408.)

Reviews the chemical section of the report in particular, stating that it "is certainly one of the most important contributions ever made to our knowledge of the combustion of fuel."

***Franklin,** John S.
Smoke prevention. 1912. (In Cassier's magazine, v. 42, p. 258-262.)

Concerned chiefly with chemistry of combustion and of smokeless combustion.

***Goss,** W. F. M.
Comparative tests of run-of-mine and briquetted coal on locomotives, including torpedo-boat tests and some foreign specifications

***Goss,** W. F. M.—*continued.*
for briquetted fuel. 57 p. 35 fig. 4 pl. 1908. (United States—Geological Survey. Bulletin 363.)

**The same.* 58 p. 1911. (United States—Bureau of Mines. Bulletin 37.)

Discusses smoke and smoke density, p. 24-32, presenting results of observations graphically and in tabular form.

***Hallett,** Edwin S.
Principles of smokeless combustion. 1 dr. 1909. (In American journal of public hygiene, v. 19, p. 467-472.)

Non-technical presentation of the possibility of comparatively smokeless combustion.

***Harger,** John.
Coal, and the prevention of explosions and fires in mines. 183 p. 1913. Longmans.

"Author has found that gas and smoke . . . can be burnt completely if the flue gases, while still hot, are passed over a catalytic material—such as bog iron ore (preferably titaniferous bog iron ore.) By means of this or some similar process complete combustion can be effected; all the heat of combustion can be obtained, and what is perhaps of even greater importance, the nuisance of smoky chimneys can be entirely eliminated." p. 34.

***Hempel,** Walther.
Verbrennung, rauchlose feuerung und heizung. 800 w. 1895. (In Zeitschrift für angewandte chemie, v. 8, p. 729.)

**The same, translation.* (In Colliery guardian, v. 72, p. 173.)

Author claims that the character of the gaseous products of combustion depends less upon the quantity of oxygen present than upon conditions of temperature and pressure.

***Hirshfeld,** C. F. & **Barnard,** William N.
Conditions for complete and smokeless combustion. 1913. (In their "Elements of heat-power engineering," p. 506-508.)

Concise presentation of general principles of combustion and loss due to smoke.

***Hubbard,** Charles L.
Smokeless combustion. 1908. (In Electrical review and western electrician, v. 53, p. 858-859, 903-904.)

Reviews principles of combustion and methods of hand and mechanical firing.

***International Correspondence Schools, Scranton, Pa.**
Economic combustion of coal. 25 p. 2 dr. 1902. (In International library of technology, v. 7, section 17.)

Considers principles of combustion, cause and prevention of smoke and efficient combustion of coal.

***Le Chatelier,** Henry.
Lecons sur le carbone, la combustion, les lois chimiques. 456 p. 54 diag. and ill. 1908. Dunod.

"Index bibliographique," p. 445-450.
Lectures on general chemistry, taking as the central subject carbon and its inorganic compounds. Treats the forms of carbon comprehensively, giving considerable attention to combustion.

***Lessing,** R.
Calorimetric control of the supply and consumption of fuel. 1909. (In Papers read at the Smoke Abatement Conferences at Sheffield, March, 1909. p. 50-63.)

Purchase of coal with consideration of its calorific value is discussed. More care should be given to quality of coal.

***Pleasanton,** Augustus James, *and others.*
Influence of the blue ray of the sunlight and of the blue colour of the sky in developing animal and vegetable life, in arresting disease, and in restoring health in acute and chronic disorders to human and domestic animals, as illustrated by the experiments of Gen. A. J. Pleasanton and others between the years 1861 and 1876. 185 p. 1876.

**The same.* 1877.

Book containing some queer statements. Discusses smoke and combustion briefly, p. 170-171. "Whoever has seen one of our western prairies on fire, must have observed . . . in the bright sunshine, that the combustion of the dry grass and herbage was slow . . . till a canopy of smoke intercepting the sunlight, allowed a current of air to be formed beneath the smoke, which fanned the combustion into active flame. These results were from the removal of the oxygen gas from the air in the first place, by the blue ray of the sunlight de-oxydizing it, and in the second part, obscuring the sunlight by the canopy of smoke, which permitted the oxygen gas in the atmosphere to be reunited to the air beneath it, and to supply the oxygen gas to support the new combustion on the prairie."

***Porter,** Horace C. & **Ovitz,** F. K.
Volatile matter of coal. 56 p. 1 pl. 1910. (United States—Bureau of Mines. Bulletin 1.)

"Bearing on smoke production," p. 9.
Shows relation between volatile matter in coal and production of smoke.

***Randall,** D. T.
Relation of government fuel investigations to the solution of the smoke problem. 1908. (In Boiler maker, v. 8, p. 301-302.)

Outlines work of investigation, intention being (1908) to attack the problem entirely from the engineering and not at all from the legal side.

***Randall,** D. T.
Smoke prevention; the relation of the character of coals to the prevention of smoke. 1909. (In Scientific American supplement, v. 67, p. 402-403.)

**The same.* (In Electrochemical and metallurgical industry, v. 7, p. 544-546.)

"Paper presented at the Syracuse meeting of the International Association for the Prevention of Smoke, June 24th to 26th, 1909."
Concludes that smoke may be reduced and in most cases prevented by burning fuel low in volatile matter, or by burning bituminous coal in a specially designed furnace with careful firing and competent supervision.

***Randall,** D. T.
Tests of coal and briquets as fuel for house-heating boilers. 44 p. 2 fig. 3 pl. 1908. (United States—Geological Survey. Bulletin 366.)

**The same.* 1911. (United States—Bureau of Mines. Bulletin 27.)

There seems to be no advantage in briquets over coal of a suitable size for house-heating boilers. Briquetting is justifiable only to convert slack to a more convenient form. The briquets tested gave off much smoke (due largely to nature of binder), and thus are unsuited to domestic use. Coals with high fixed carbon are most economical and give least smoke.

***Ray,** Walter T. & **Kreisinger,** Henry.
Comparative tests of run-of-mine and briquetted coal on the torpedo boat Biddle, made with the collaboration of Lieut. Commander Kenneth McAlpine, U. S. N., and Ensign J. W. Hayward, U. S. N. 49 p. 10 ill. 5 tables. 1909. (United States—Geological Survey. Bulletin 403.)

**The same.* 50 p. 1911. (United States—Bureau of Mines. Bulletin 33.)

Deals briefly with smoke production, p. 15, 26-27.

***Rhead,** Thomas Fred Eric, & **Wheeler,** Richard Vernon.
The combustion of carbon. 1912. (In Journal of the Chemical Society, v. 101, p. 846-856.)

Experimental investigation of reactions when carbon burns in oxygen.

***Rhead,** Thomas Fred Eric, & **Wheeler,** Richard Vernon.
The mode of combustion of carbon. 6 diag. 1913. (In Journal of the Chemical Society, v. 103, p. 461-489.)

"In the present paper we . . . put forward an hypothesis as to the manner in which solid carbon burns, which appears to us to leave no known fact unexplained."
Scholarly paper, presenting results of extensive experimentation.

***Rhead,** Thomas Fred Eric, & **Wheeler,** Richard Vernon.
Rate of reduction of carbon dioxide by carbon. 1 dr. 1 diag. 1912. (In Journal of the Chemical Society, v. 101, p. 831-845.)

***Townsend,** David.
Smoke problem. 1907. (In Cassier's magazine, v. 32, p. 539-543.)

Believes problem can best be studied by carefully watching temperature, and chemical composition of chimney gases. Favors effective enforcement of smoke ordinances.

***Wright,** Lewis T.
On the alleged escape of carbonic oxide and unconsumed carbon from coal-gas flames. 1895. (In Journal of gas lighting, v. 66, p. 1023-1024.)

Reviews work of various authorities, with conclusion that carbon monoxid is not given off by gas flames used for lighting.

Sources of Smoke

Smoke nuisance in general

Adam, Paul.
Hygiène des villes fumées et odeurs. 1908. (In Annales d'hygiène publique et de médecine légale, ser. 4, v. 10, p. 289-305.)

From "Rapport sur les operations du service d'inspection des établissements classés" for 1907. Portion dealing with smoke is mainly an analysis of complaints.

***Ascher,** Louis.
Ueber die rauch- und russplage. 400 w. 1911. (In Rauch und staub, v. 2, p. 50-51.)

Abstract from "Gartenstadt," v. 5, pt. 10, p. 130 et seq.

***Bach,** C.
Ueber den stand der frage der rauchbelästigung durch dampfkesselfeuerung. 1896. (In Zeitschrift des Vereines deutscher Ingenieure, v. 40, pt. 1, p. 492-494, 603-604.)

Gives foot-note references to German literature.

Bach, C. & **Peters,** Th.
Zur frage der rauchbelästigung. 1893. (In Zeitschrift des Vereines deutscher Ingenieure, v. 37, p. 1236-1237.)

General review of developments. Foot-note references to articles on smoke problem published in "Zeitschrift des Vereines deutscher Ingenieure," 1882-1892.

***Benner,** Raymond C.
Why smoke is an industrial nuisance. 2 ill. 1913. (In Iron age, v. 91, p. 135-138.)

******The same.* *7 ill.* 1913. (In Scientific American supplement, v. 75, p. 168-170.)

Estimates and comments on loss in fuel value, loss from damage of smoke to property and health and effect of smoke on vegetation and the atmosphere.

***Brewster,** E. H. G.
The smoke nuisance, and an account of some experiments relating thereto. 1883. (In Builder, London, v. 44, p. 344-346.)

Paper before the Society of Civil and Mechanical Engineers.
Reviews history of smoke nuisance and efforts to prevent it. Experiments seemed to show that smoke, when once produced, could not be made unobjectionable.

***Buchholz,** M.
Beitrag zur rauch- und russplage. 16 p. 1910. (Sammlung berg- und hüttenmännischer abhandlungen.)

Reprinted from "Berg- und hüttenmännische rundschau." [20 May, 1910, p. 163-167.]
Pamphlet, considering causes of smoke and preventive measures.

**The same, abstract.* 700 w. 1910. (In Rauch und staub, v. 1, p. 26, 56.)

***Des Vœux,** H. A.
Let there be light. 1911. (In Proceedings of the Conference of the Smoke Abatement League of Great Britain, Manchester, 21-22 Nov., 1911, p. 16-21.)

General discussion of the smoke nuisance.

***Discussion** of the smoke nuisance. 1891. (In Journal of gas lighting, v. 58, p. 527-528.)

Reviews, papers and discussions at the meeting of the Seventh International Congress of Hygiene and Demography.

Evelyn, John.
Fumifugium: or the inconveniencie of the aer and smoak of London dissipated; together with some remedies humbly proposed. 36 p. 1825. (In his "Miscellaneous writings," p. 204-242.) Henry Colburn.

Reprint of 1661 edition.

Flinzer.
Ueber rauchbelästigung in städten. 1886. (In Deutsche vierteljahrsschrift für die öffentliche gesundheitspflege, v. 18, p. 87-112.)

With discussion. Deals with smoke in general. Gives history very briefly.

***Gebecke.**
Zur beurteilung der rauch- und russfrage. 150 w. 1911. (In Rauch und staub, v. 1, p. 301.)

Abstract from "Zeitschrift für hygiene und infektionskrankh.," 1911, v. 68, p. 105-156.

***Gillespie,** C. G. K.
Physical effects of air pollution. 12 dr. p. 55-70. 1887. (Manchester and Salford Noxious Vapours Abatement Association. Lectures on air pollution, No. 5.)

Popular lecture (with experiments) on domestic and industrial sources of air pollution and physiological effects of vitiated air. Deals in part with coal smoke.

Glinzer, E.
Die rauchplage und ihre abhilfe. 34 p. 1890.
Considers briefly the causes of smoke, conditions in various European cities, and remedial measures.

***Hahn,** Martin.
Rauch- und russplage in den grossstädten. 350 w. 1910. (In Rauch und staub, v. 1, p. 102.)
Abstract of address at meeting of "Deutscher Verein für öffentliche Gesundheitspflege," Berlin.

***Leigh,** John.
Coal-smoke; its nature, and suggestions for its abatement. 19 p. 1883.
Report to the health and nuisance committees of the Corporation of Manchester.

***Lodge,** Oliver.
Science and smoke. 1909. (In Papers read at the Smoke Abatement Conferences at Sheffield, March, 1909, p. 5-11.)
Discusses generally the harmful effects of smoke, and its wastefulness.

***Macauley,** John.
Smoke nuisance and its abatement. 1912. (In Journal of the Royal Sanitary Institute, v. 33, p. 78-83.)
Conditions for formation and abatement of smoke.

***Maleire,** E.
Fumée dans les grandes villes. 2,500 w. 1906. (In Génie civil, v. 49, p. 183.)
Causes of production, preventive measures, harmful effects, conditions in Paris.

***Mehrtens,** John H.
Zur rauchbelästigungsfrage. 1896. (In Glasers annalen für gewerbe und bauwesen, v. 38, p. 85-92.)
General consideration of magnitude and cause of the smoke nuisance and of prospects of relief. Advantages of various fuels are considered.

***Muir,** George Walker.
On the smoke nuisance, considered morally, historically, scientifically and practically. 1855. (In Journal of the Society of Arts, v. 3, p. 134-142.)
Discussion, p. 142-146.
Considers dimensions of furnace to be fundamental consideration and discusses consumption of smoke after formation. Criticizes views of C. W. Williams.
See also review by Williams, p. 241.

***Olmsted,** Frederick Law, *and others.*
The smoke nuisance. 32 p. 23 dr. 1908. (In American Civic Association—Department of Nuisances [Publications], ser. 2, No. 1. March, 1908.)
"Bibliography," p. 32. (15 references.)

**The same,* ed. 2, rev. 1911, 52 p. Feb., 1911.
Pamphlet giving a general view of evils of smoke and methods of prevention. Non-technical. Educational in intent.

***Pasinski,** v.
Die rauchfrage als kulturproblem. 1912. (In Rauch und staub, v. 2, p. 335-338.)

Rauchbelästigung in grosser städte. 18 p. 1893. (In Denkschriften des Verbandes deutscher Architekten- und Ingenieur-Vereine, heft 1.)
Considers fuels, formation of smoke and practical methods of prevention.

Reed, Charles A. L.
The smoke question viewed from a national standpoint. 1905. (In American medicine, v. 9, p. 703-705.)

Paper before Woman's Club of Cincinnati.
Discusses sanitary and moral aspects, ethics of the air, damage of smoke, practical difficulties in smoke abatement and necessity for a national movement.

***Rees,** Abraham, *editor.*
Smoke. 350 w. 1819. (In The Cyclopædia or universal dictionary of arts, sciences, and literature, by Abraham Rees. v. 33.)

***Rowan,** F. J.
The smoke problem. 71 p. Ill. 1904. (In Transactions of the Institution of Engineers and Shipbuilders in Scotland, v. 48, p 7.)

Production, estimation and prevention of smoke, and the problem of municipal control. Lengthy discussion, p. 23-27.

Schmatolla, Ernst.
Rauchplage und brennstoffverschwendung und deren verhütung. 84 p. Ill. 1902.

The same, abstract and review, by "N." 1902. (In Gesundheits-ingenieur, v. 25, p. 301-305.)

***Schmatolla,** Ernst.
Ueber rauchentstehung und rauchverhütung. 10 dr. 1901. (In Zeitschrift für angewandte chemie, v. 14, p. 1272-1282.)

Detailed consideration of principles of combustion and conditions favoring abatement of smoke, with attention to design of furnaces.

***Schreiber,** H.
Moorrauch. 250 w. 1912. (In Rauch und staub, v. 2, p. 293.)

Abstract from "Oesterreichische moorzeitschrift." 1912, no. 6, p. 88.
Nature of smoke from turf, and extent of nuisance.

***[Schubbert.]**
Zur frage der rauchbelästigung. 1896. (In Zeitschrift des Vereines deutscher Ingenieure, v. 40, pt. 1, p. 522.)

Abstract of paper before Frankfurter Bezirksverein, 19 Feb., 1896.

Smoke. 1912. (In Standard American encyclopedia, v. 7.)

The same. 1909. (In Practical home encyclopedia, v. 7.)

Briefly discusses cause and remedies. Pittsburgh is the only place definitely mentioned. "So great is the nuisance that white articles of external dress are almost discarded in consequence of their becoming immediately soiled."

Smoke; smoke-prevention. 1861. (In English cyclopædia; a new dictionary of universal knowledge. Arts and sciences, v. 7, col. 629-630.)

Brief history of apparatus, and discussion of causes of smoke.

***Smoke** and smoke prevention. (In Electrical review, New York, v. 48, p. 335-336.)

Gives abstracts of remarks at symposium on smoke and smoke prevention held by New York section of the Society of Chemical Industry.

***Smoke** nuisance. 1,000 w. 1854. (In Chambers's journal, v. 21, p. 201.)

***Smoke** nuisance. 2,800 w. 1899. (In Builder, London, v. 77, p. 143.)

Evils of smoke in England and a plea for abatement. Does not consider methods.

***Smoke** nuisance. 1902. (In Outlook, New York, v. 71, p. 710-711.)

Editorial discussion of effects of imperfect combustion of soft coal and of means for prevention.

***Smoke** nuisance. 1908. (In Engineering, v. 85, p. 861.)

**The same*. (In Industrial world, v. 83, p. 838.)

Note on opinion at Manchester and summary of conclusions in report of Syracuse (N. Y.) Chamber of Commerce.

***Smoke** nuisance. 1909. (In New international encyclopædia, ed. 2; v. 18, p. 269.)

Brief summing up of causes and prevention of smoke.

***Smoke-plague** and its remedy. 4,000 w. 1890. (In Macmillan's magazine, v. 62, p. 204.)

Sources of coal smoke, advantages of prevention and description of preventive apparatus.

Stange, Max.

Rauchbelästigung und deren bekämpfung. 98 p. 1906.

Considers smoke and its prevention with reference to stationary boilers, marine and locomotive boilers, industrial furnaces, central-heating and domestic heating.

"Literatur, gesetzsammlungen, zeitschriften," p. 97-98. (28 references.)

Domestic

***Barker,** A. H.

Barker on heating; the theory and practice of heating and ventilation. 640 + 76 p. 1912. Carton Press.

"Smoke and fume formation," p. 388-389.

Brief general statement. Book contains also a discussion of combustion, fuel economy, chimneys and other related topics.

Booer, W. J.

Smokeless ovens, and the advantages of using gas as a fuel; a lecture delivered in the lecture room of the Smoke Abatement Exhibition, South Kensington, February 13, 1882. 11 p. Ill. 1882. London, T. Richards.

Brady, Antonio.

Prevention of smoke in fire-places. 1881. (In Transactions of the Brighton Health Congress, 1881. 1882. p. 243-249.)

Compilation, dealing in a general, popular way with legislation, exhibitions, fuel waste due to smoke, and possible remedies. Claims that the greatest need is not more stringent laws, but easier way of enforcing them.

***Cohen,** Julius Berend, & **Hefford,** G.

Combustion of coal in house fires. 1893. (In Journal of the Society of Chemical Industry, v. 12, p. 121-123.)

Considers completeness of combustion in house fires, and gives analyses of gases from coal and from gas fires.

***Cohen,** Julius Berend, & **Russell,** G. H.

Combustion of coal and gas in house fires. 1896. (In Journal of the Society of Chemical Industry, v. 15, p. 86-90.)

**The same, condensed.* (In Journal of gas lighting, v. 67, p. 624-625.)

Object of investigations was to re-determine extent of pollution of town air by smoke from house fires burning coal and to investigate relief obtained by use of gas as fuel.

***Des Vœux,** H. A.

Abatement of smoke from private houses. 1,500 w. 1906. (In Journal of the Royal Sanitary Institute, v. 27, p. 64-67.)

Discussion. 2,000 w. p. 102.

**The same.* 1906. (In Addresses, papers and discussions at Conference on Smoke Abatement, p. 20-23.)

Argues for the use of gas for heating and cooking. Use of smokeless solid fuels and of electric heaters is recommended also.

***Dr. Arnott** on smokeless fires and pure air in houses. 2,400 w. 1855. (In Chambers's journal, v. 24, p. 174.)

Lengthy review of Neil Arnott's "Smokeless fireplace, chimney-valves, and other means old and new, of obtaining healthful warmth and ventilation."

***Franklin,** Benjamin.

Description of a new stove for burning of pitcoal, and consuming all its smoke. 20 dr. 1786. (In Transactions of the American Philosophical Society, v. 2, p. 57-74.)

**The same,* 1906. (In "Writings of Benjamin Franklin, collected and edited . . . by Alfred Henry Smith," v. 9, p. 443-462.)

Galton, Douglas.

Abatement of smoke in fires for warming and ventilation. 1882. (In Sanitary Engineer, v. 6, p. 63-64, 85-86, 143-144.)

Second and third instalments have title "Smoke abatement appliances." Discusses in part district or central station steam heating.

***Galton,** Douglas.

Exhibition of smoke abatement appliances. 1882. (In Art journal, London, v. 34, p. 104-105.)

Considers advantages of open fireplace, and the changes which gas heating would entail. Classifies exhibits of open fireplaces which seek to prevent smoke.

***Galton,** Douglas.

Smoke abatement; what is the best method of dealing with the products of combustion? 1884. (In Transactions of the National Association for the Promotion of Social Science, v. 28, p. 443-459.)

Discusses especially use of gas as fuel and substitution of other methods of heating instead of open fireplace.

***Gillespie,** George Curtis.

Rumford fireplaces and how they are made, containing Benjamin, Count of Rumford's essay on "Proper fireplace construction." A plea for a more general consideration of the form and proportion of a very much neglected feature of our homes and buildings, with nearly two hundred illustrations including the original Rumford drawings. 198 p. 1906. Comstock.

Considerable attention to prevention of domestic smoke.

***Hauser,** K.

Versuche mit einer rauchfreien hausbrand-feuerung. 1 dr. 4 ill. 1913. (In Rauch und staub, v. 3, p. 159-162.)

***Hodgkinson,** W. R. E.

Notes on the smoke abatement problem, with special reference to domestic fires and the smokeless production of steel. 1912. (In Papers read at the Smoke Abatement Conferences, March . . . 1912, p. 88-91.)

Claims generally that much of smoke from steel works is unnecessary.

***Horsfall,** T. C.

The nuisance of smoke from domestic fires and methods of abating it. 4 ill. 20 p. [1893.] (Manchester and Salford Noxious Vapours Abatement Association. Lectures on air pollution, ser 3, No. 3.)

Considers injurious effects of smoke, stating that smoke from domestic fires is greater in quantity and more injurious than smoke from industrial furnaces, and that domestic smoke is preventable. Discusses defects of existing (1893) methods of heating and cooking, describes improved devices and suggests desirable legislation.

Hurdelbrink.
Bericht über die prüfung mehrerer zimmeröfen auf rauchfreie verbrennung. 1909. (In Deutsche vierteljahrsschrift für öffentliche gesundheitspflege, v. 41, p. 379-381.)

***Livesey,** George.
Domestic smoke abatement. 2,500 w. 1906. (In Journal of the Royal Sanitary Institute, v. 27, p. 57.)

**The same.* 1906. (In Addresses, papers and discussions at Conference on Smoke Abatement, p. 13-19.)

Believes introduction of gas for domestic heating to be necessary for solution of problem.

Mehl, W.
Über rauch und russ, sowie deren verminderung unter besonderer berücksichtigung der hauslichen feuerungsanlagen. 51 p. Ill. 1903.

***Neisser.**
Stadtverrussung und hausfeuerung. 1911. (In Rauch und staub, v. 1, p. 232-233.)

Abstract from "Umschau," Frankfurt a. M.

***Prevention** of smoke. 800 w. 1888. (In Nature, v. 39, p. 25.)

Editorial, suggested by F. A. R. Russell's lecture, "Smoke in relation to fogs in London" Lays considerable stress on part played by domestic fireplace, which is said to be chief cause of the smoke nuisance.

Rauch- und russplage und die sanierung unserer haushaltungsfeuerungen; senkingherde mit rauchverzehrender feuerung. 1 dr. 1906. (In Gesundheits-ingenieur, v. 29, p. 545-547.)

Discusses furnace patented by Stier. (German patent 144,976.)

***Schwartze,** Th.
Die heizungsfrage mit bezug auf rauchlose verbrennung. 1 dr. 1884. (In Neueste erfindungen und erfahrungen auf den gebieten der praktischen technik, v. 11, p. 203-205.)

Considers fuels and principles. Describes smoke-preventing device of the author.

***Smith,** Bailie W. B.
Should the domestic smoke nuisance be any longer tolerated? 3 diag. 1912. (In Papers read at the Smoke Abatement Conferences, March . . . 1912, p. 62-67.)

Advantages of gaseous fuel are recounted. Charts are given showing deaths from bronchial diseases as result of weather conditions.

***Smith,** W. B.
Domestic smoke. 1911. (In Proceedings of the Conference of the Smoke Abatement League of Great Britain, Manchester, 21-22 Nov., 1911, p. 73-75.)

Discussion, p. 75-78.
Deals briefly with conditions in Glasgow, where in winter about four-fifths of the existing smoke is from domestic fires.

***Smoke** abatement; report of the committee of the Smoke Abatement Exhibition. 1883. (In Nature, v. 27, p. 407-408.)

Refers mainly to chemical work and results on gases given off by domestic stoves and grates.

***Smoke** nuisance. 350 w. 1910. (In Engineering, v. 90, p. 742.)

**The same, translated.* 1911. (In Rauch und staub, v. 1, p. 133.)

Notes on C. E. Stromeyer's memorandum to the Manchester Steam-Users' Associations. Largely a criticism of domestic smoke nuisance.

***Smoke** problem in large towns. 1907. (In Transactions of the Royal Sanitary Institute, v. 28, p. 485-506.)

Discussion, opened by Louis C. Parkes and H. A. DesVœux. First speaker recommends desirable changes in existing (1907) law on the question of smoke nuisances; second speaker considers advantage of change in system of heating for small houses.

***Snodgrass,** J. M.

Use of Illinois coal for domestic purposes. 1908. (In Illinois—Geological Survey. Bulletin 14, p. 223-228.)

Compares costs and fuel economy of different coals in Illinois, showing demand for low-grade, smoke-producing Illinois coal for domestic use.

***Stack.**

Wie beschickt man hausfeuerungen am zweckmässigsten? 400 w. 1905. (In Zeitschrift des Vereines deutscher Ingenieure, v. 49, pt. 1, p. 100.)

Abstract of address before Hannoverscher Bezirksverein.

Considers domestic smoke the most serious problem to be dealt with, and discusses methods of amelioration.

***Stange,** Max.

Oesterreichische Gesellschaft zur Bekämpfung der Rauch- und Staubplage. Wie kann in bädern und kurorten ohne industrie der rauch- und russbelästigung entgegengewirkt werden? 1912. (In Rauch und staub, v. 2, p. 222-226, 246-250.)

Considers smoke from domestic fires and lesser industries common to most municipalities, such as bakeries, laundries, slaughter-houses, central-heating plants, etc. Advises substitution of gas for coal in homes and shops located in health resorts.

***Taaks.**

Feuerungsanlagen, insbesondere über hausfeuerung und anordnung der rauchröhren. 1889. (In Zeitschrift des Vereines deutscher Ingenieure, v. 33, pt. 2, p. 806-807.)

With discussion.

Abstract of address before Hannoverscher Bezirksverein.

Tests of certain open domestic grates; report by the Coal Abatement Society. 5 diag. 9 ill. 1904. (In Lancet, 1904, v. 1, p. 529-534.)

Detailed tests of selected open fireplaces, with careful records of smoke intensity and fuel economy.

***Town** smoke. 1893. (In Journal of the Society of Chemical Industry, v. 12, p. 325.)

Discussion, considering particularly domestic fires as important source of smoke.

***Wagner,** Albert.

Rauchverzehrende feuerung für jedes brennmaterial. 1870. (In Dingler's polytechnisches journal, v. 198, p. 354-356.)

Describes peculiarly constructed stove, arranged either for use in kitchens or for heating of apartments.

Industrial

General

***Davis,** George E.

Manufacturing smoke. 1890. (In Scientific American supplement, v. 30, p. 12428-12429.)

Lecture at the Manchester Technical Laboratory.

Experiments show theory of combustion and of smoke production. Necessary qualifications of mechanical devices for preventing smoke are shown.

***Elsas,** Oscar.

What methods have been successfully employed to diminish smoke from mill chimneys? 1 diag. 1899. (In Transactions of the New England Cotton Manufacturerers' Association, v. 67, p. 259-265.)

Adoption of Hawley down draft furnace solved question in one plant.

***George,** Hector.

Les fumées industrielles. 1887. (In Génie civil, v. 12, p. 118-119.)

Concerned particularly with formation and harmful effects of hydrochloric acid gas, sulphur and nitrous fumes, hydrogen sulphid, etc.

***Kershaw,** John B. C.

Industrial smoke and its prevention. 1905. (In Cassier's magazine, v. 29, p. 109-114.)

Briefly summarizes a very few of the books and papers on the smoke problem that have appeared during the last 65 years.

***Klocke.**

Zur frage der rauchverminderung im industriebezirke. 8 dr. 1909. (In Stahl und eisen, v. 29, pt. 1, p. 170-176.)

Describes devices adopted by different industrial works to prevent smoke.

***Rippert,** P.

Beiträge zur beurteilung von rauchschäden im rheinisch-westfälischen industriegebiet. 1912. (In Glückauf, v. 48, pt. 2, p. 1992-2000, 2026-2037.)

**The same, condensed.* 1913. (In Rauch und staub, v. 3, p. 150-154.)

***Simpson,** James, *jr.*

On the prevention of smoke in engine furnaces. 1854. (In Minutes of Proceedings of the Institution of Civil Engineers, v. 13, p. 383-396.)

Discussion, p. 405-415.
With appendix: "Description of some of the smoke-consuming apparatus at present (1854) in use, with remarks thereon."

***Smoke** and grit from electric and factory chimneys. Can smoke be recorded and practically diminished? 2,500 w. 1901. (In Electrical review, London, v. 48, p. 863, 1005.)

***Smoke** nuisance in industrial centers. 1903. (In American monthly review of reviews, v. 28, p. 103-104.)

Brief general summary from "Deutsche revue."

***Vassar,** H. S.

Smoke prevention in large power stations. 1911. (In Canadian engineer, v. 21, p. 735.)

From paper before International Association for the Prevention of Smoke.
Difficulties caused by uncertain load. Intelligent supervision of boiler room necessary.

***Verunreinigung** der atmosphäre durch fabriken und gewerbe. 1876. (In Dingler's polytechnisches journal, v. 220, p. 87-89.)

Considers smoke from different industrial sources and takes up relative sensitiveness of the different trees to smoke constituents.

***Vogt.**

[Rauchbelästigung durch die industrie.] 1899. (In Zeitschrift des Vereines deutscher Ingénieure, v. 43, pt. 1, p. 131.)

Brief abstract of address before Bergischer Bezirksverein. Touches on conditions in Paris and Berlin.

Railroads, including effect on tunnels

***American Railway Master Mechanics' Association.**
Report of Committee on smoke-consuming devices for firing up locomotives at terminals. 1911. (In Proceedings of the American Railway Master Mechanics' Association, v. 44, p. 88-89.)
Discussion, p. 89-100.

**The same, abstract.* 600 w. 1911. (In Engineering news, v. 65, p. 767.)
Recommendations based on replies to circular of inquiry, though only 33 roads responded. "In general the conclusion is, that although there are many devices for reducing the amount of smoke from locomotives after steam is raised and engines are working, and while it is possible by great care and attention on the part of the roundhouse force to reduce the amount of smoke emitted during this period, at the same time we find no practical way to entirely eliminate all smoke while firing up locomotives at terminals."

***Benjamin,** Charles H.
Locomotive smoke abatement in Cleveland. 2 ill. 1901. (In Railroad gazette, v. 33, p. 869.)
Letter, showing progress and describing methods of regulation.

***Bird,** Paul P.
Locomotive smoke in Chicago. 5 diag. 1911. (In Journal of the Western Society of Engineers, v. 16, p. 273-317.)

**The same, abstract translation.* 1911. (In Rauch und staub, v. 1, p. 244-246.)

**The same, condensed.* (In Engineering news, v. 65, p. 262.)
Gives results from careful observations, showing density of smoke from railroads, etc.

***Brislee,** F. J.
The combustion processes in the locomotive fire box. 2 dr. 1907. In Journal of the Society of Chemical Industry, v. 26, pt. 2, p. 804-811.)
Discusses theory and gives results of many tests to determine efficiency with various speeds and gradients. Most efficient combustion takes place when the vacuum is relatively small and the speed high.

***Buchanan's** smoke-prevention fire-box. 1,200 w. 1 dr. 1884. (In American machinist, v. 7, Oct. 18, p. 6.)
For locomotive use.

***Burt,** Horace G.
Railway smoke abatement in Chicago. 1912. (In Engineering news, v. 67, p. 54-56.)
Condensed from author's report as chief engineer of the Chicago Association of Commerce, Committee of Investigation on Smoke Abatement and Electrification of Railway Terminals.

***Caruthers,** C. H.
Smoke consuming question forty-eight years ago. 7 dr. 2 ill. 1907. (In Railroad gazette, v. 43, p. 719-724.)
More extended account of experiments on P. R. R. in 1859, described in author's previous paper (v. 39, p. 514). "The author has at no time found records of experiments . . . on any other road so carefully conducted." Tests conducted between Altoona and Gallitzin, and Altoona and Mifflin. Proved that smoke could be greatly reduced; that soft coal was superior to best grades of wood, and that Pittsburgh coal from storage bins was only very slightly inferior to Broad Top coal (mined for the experiments on account of its more rapid deterioration due to exposure).

***Caruthers,** C. H.
Early experiments with smoke-consuming fire-boxes on American locomotives. 2,500 w. Ill. 1905. (In Railroad gazette, v. 39, p. 514.)

Construction and operation of equipment between 1840 and 1860.

Chicago—Council. Committee on Local Transportation.
The electrification of railway terminals as a cure for the locomotive smoke evil in Chicago, with special consideration of the Illinois Central Railroad. Prepared under the auspices of the Mayor and Committee on Local Transportation of the City Council by Milton J. Foreman, Chairman . . . William A. Evans, Commissioner of Health; Paul P. Bird, Smoke Inspector; Gilbert E. Ryder, Smoke Inspection Department; Herbert H. Evans, Mechanical Engineer. Chicago. 353 p. Ill. 1908. R. R. Donnelly & Sons Co.

Deals mainly with problems of electrification, but has 23 pages devoted to the harm of smoke, the prevention of smoke in Chicago, the railroads as smoke producers, the possibility of smokeless steam locomotive traction, and anthracite coal and coke as remedies. Concludes that smoke is injurious to health and is expensive; that while stationary steam plants can be operated practically without smoke, smokeless operation of locomotives in service is impracticable; that it is not feasible for Chicago railroads to use either coke or coal for any large number of locomotives; that electric traction is feasible and would remedy so much of the smoke evil as results from locomotive smoke.

Chicago, Burlington & Quincy Railroad Company.
Burlington route. Special instructions regarding fuel economy. 108 p. 1901.

Contents: Economical firing.—Economical boiler-feeding.—Economical use of steam.

***Density** of locomotive smoke in Chicago. 1912. (In Railway age gazette, v. 53, p. 839.)

Based on records compiled by engineers of the Chicago Association of Commerce, Committee on Smoke Abatement and Electrification.

***Eliminating** smoke with locomotives burning soft coal. 1907. (In Engineering news, v. 58, p. 308-309.)

Abstract of report to Traveling Engineers' Association. Gives recommendations for improvement of practice. Concludes that mechanical devices of some kind, to assist the fireman, must sooner or later come into use.

***Emperger,** F. von.
[Rauchabführung.] 1912. (In his "Handbuch der eisenbetonbau," ed. 2, v. 7, p. 195-197.)

Brief notes on removal of smoke from locomotive sheds.

***Folgen** des lokomotivrauches bei eisenbahntunnels. 1911. (In Tonindustrie-zeitung, v. 35, pt. 2, p. 1308-1309.)

**The same, abstract.* 1911. (In Rauch und staub, v. 2, p. 51.)

Discusses extent and injurious action of combustion products from sulphur-bearing coals. Gives calculations on formation of gypsum from lime in tunnel lining by action of sulphuric acid in locomotive smoke.

***Garbe.**
Verminderung der rauchplage bei lokomotiv- und anderen kesselfeuerungen durch anwendung des Langer'schen verfahrens und der neuen Langer-Marcotty'schen einrichtung. 20 dr. 1898. (In Glasers annalen für gewerbe und bauwesen, v. 43, p. 165-173.)

**The same, abstract.* 1898. (In Zeitschrift des Vereines deutscher Ingenieure, v. 42, pt. 2, p. 1199-1200.)

Address before the Verein für Eisenbahnkunde zu Berlin.

***Gibbs,** Alfred W.

Problem of reducing smoke on railroads. 1909. (In Engineering news, v. 61, p. 447-449.)

**The same.* 1909. (In Railroad age gazette, v. 46, p. 412-415.)

**The same, abstract.* 1909. (In Scientific American supplement, v. 67, p. 258-259.)

Emphasizes difficult nature of problem confronting railroads, and outlines attempts at solution by installation of automatic devices for firing, supervision and training of firemen, and experiments with electrification. On nineteen of the principal roads recent fuel bills exceeded 11.4% of total operating expenses, or nearly 8% of the gross earnings. Considers possible economy resulting from change in form of fuel or from improved methods of firing.

By General Superintendent of Motive Power, P. R. R. Co., Altoona, Pa. Paper prepared at request of American Civic Association (not the American Civic Federation, as stated in foot-note).

Higginson, C. M.

Soft coal burning. ed. 6. 19 p. Ill. 1910.

Methods based on long practice and results of experiments. Chiefly concerned with locomotive firing.

***Hoffman,** William A.

Problem of smoke abatement so far as it relates to steam railroads. 1912. (In Proceedings of the St. Louis Railway Club, v. 17, p. 48-55.)

Discussion, p. 56-64.

By Inspector of Boilers, Elevators and Smoke Abatement, St. Louis.

Careful firing is mentioned as the most important field for improvement. Records of locomotive equipment and of inspection are given.

***Lawes,** T. A.

Prevention of smoke. 1,500 w. 9 dr. 1912. (In Railway and locomotive engineering, v. 25, p. 48-49.)

Illustrates and describes equipment considered necessary to prevent emission of dense smoke from locomotives. Discusses briefly the "Security" brick arch, claiming advantages over former types, and especially recommends steam inducted air jets.

***Locomotive** dictionary. ed. 3. 901 p. 1912. Simmons-Boardman.

"Grate," p. 59, 328-335. (Fig. 439-460.)

"Stoker," p. 105-106, 340-349. (Fig. 481-508.)

Detailed designs of locomotive grates and stokers, many of which are for soft coal and other smoky fuels.

London County Council.

Examination of the atmosphere of the Central London Railway. Reports by the Chemist and the Medical Officer of Health, to which is appended a report by Dr. Andrewes. 21 p. 1 diag. Many tables. 1902.

***MacBain,** D. R.

Elimination of smoke from locomotives; methods successfully used on large switching locomotives operated in busy yards in double crewed service. 4 dr. 1912. (In Railway age gazette, v. 53, p. 669-670.)

See also, note, p. 850.

Paper before International Association for the Prevention of Smoke, at Indianapolis, Ind., 25 Sept., 1912.

***Need** of a locomotive smoke consumer. 1902. (In Scientific American, v. 87, p. 2.)

Editorial statement.

***Othegraven.**
[Langersche rauchverbrenneinrichtung.] 350 w. 1899. (In Zeitschrift des Vereines deutscher Ingenieure, v. 43, pt. 1, p. 701.)

See also, v. 42, p. 420, 1199.
Report to Westfälischer Bezirksverein.
Langer's device, especially for locomotives, but applicable also to stationary boilers. German patent 71,876.

***Pechar,** Johann, *comp.*
Die lokomotiv-feuerbüchse für rauchverzehrung und brennstoffersparniss, mit besonderer berücksichtigung des systems Nepilly. Sonder-abdruck aus Glasers annalen für gewerbe und bauwesen, 1884, band xiv, heft 10, 11 u. 12 (ganze reihe no. 166, 167 u. 168), nebst einem anhang: Erfahrungen mit der Nepilly'schen lokomotivfeuerung, sonder-abdruck aus "Heusinger von Waldegg's Organ für die fortschritte des eisenbahnwesens," 1883, bd. xx, heft 6. 95 p. 45 ill. 1884.

***Rauch-** und staubbekämpfung im Eisenbahnbetrieb. 1912. (In Rauch und staub, v. 3, p. 10-16, 47-49.)

Various problems in connection with smokeless locomotive firing, tunnel ventilation, etc.

***Rauchbelästigung** im Hoosac-tunnel. 100 w. 1911. (In Rauch und staub, v. 1, p. 407.)

Abstract from "Zentralblatt der bauverwaltung," 2 Aug., 1911, p. 386.
Adoption of oil-fired locomotives on "Boston and Maine."

***Rauchentwicklung** bei den "Pacific"-lokomotiven. 250 w. 1912. (In Rauch und staub, v. 2, p. 235.)

Abstract from "Zeitung des Vereins deutscher Eisenbahnverwaltungen," 1912, p. 418.)

***Rauchkammer-**ueberhitzer für lokomotiven, bauart Jakobs. 150 w. 1911. (In Rauch und staub, v. 1, p. 233.)

Abstract from "Organ für die fortschritte des eisenbahnwesens," 15 Feb., 1911, p. 69.

***Rauchverbrennungs-**einrichtung für lokomotiven, gebaut von Franz Marcotty in Berlin-Schöneberg. 3 dr. 1911. (In Zeitschrift des Vereines deutscher Ingenieure, v. 55, p. 1722.)

**The same, without dr.,* 1912. (In Rauch und staub, v. 2, p. 109.)

***Roberts,** Clarence, and **Smith,** Russell M.
Practical locomotive operating. 281 p. 94 ill. 1913. Lippincott.

Comments very briefly (p. 247) on smoke prevention, quoting from "American engineer and railroad journal." Considers co-operation and careful personal attention of firemen the most important factors.

***Rohland,** Paul.
Über zwei chemische vorgänge im eisenbahtunnel. 1911. (In Zeitschrift für angewandte chemie, v. 24, p. 2011-2012.)

**The same, abstract.* 150 w. 1911. (In Rauch und staub, v. 2, p. 74.)

Protection against sulphurous acid resulting from combustion of coal in locomotives.

***Sanzin,** R.
Rauchlenkschilde an lokomotiv-schornsteinen. 300 w. 1910. (In Rauch und staub, v. 1, p. 57.)

Abstract from "Organ für die fortschritte des eisenbahnwesens," 1 May, 1910, p. 158-159.

***Sauer,** a. D.
Ausblasevorrichtung für die rauchkammer von F. H. Trevithick. 4 dr. 1907. (In Glasers annalen für gewerbe und bauwesen, v. 60, p. 32-33.)

Devices for removing dust and ashes from fire boxes of locomotives.

***Schäfer**, Ph.
Rauchabführung und lüftung der lokomotivschuppen. 1912. (In Rauch und staub, v. 2, p. 261-262.)

Abstract from "Organ für die fortschritte des eisenbahnwesens," 1912, no. 10, p. 168-170.

***Schenk**, P.
Die rauchabsaugung im neuen lokomotivschuppen des bahnhofs Lausanne. 3 ill. 3 dr. 1912. (In Rauch und staub, v. 2, p. 179-183.)

Translated from "Nouveau dépôt à locomotives de la gare de Lausanne," in "Bulletin technique de la Suisse Romande," Aug., 1911.
Plan, illustrations and description of locomotive sheds located near to passenger station and requiring rigid smoke suppression. Effective use of general system of smoke ducts.

Schröder, Julius von.
Untersuchung über die mineralbestandtheile des regenwassers. 1873. (In Tharander forstliches jahrbuch, v. 23, p. 68-87.)

Considers varying composition as affected by local conditions, mentioning effect of locomotive smoke in region near railroad.

***Smoke** prevention and electrification. 1909. (In Electric railway journal, v. 33, p. 673.)

Comment on paper by A. W. Gibbs, with some of author's doubts and objections.

***Smoke** prevention on locomotives. 1909. (In Boiler Maker, v. 9, p. 73-76.)

Effect of use of brick arches is given particular attention and tables are given showing comparative tests.

***Smoke** prevention on railways. 750 w. 1867. (In English mechanic and mirror of science and art, v. 5, p. 290.

***Starbuck**, R. B.
Coal consumption. 1,000 w. Ill. 1902. (In Proceedings of the St. Louis Railway Club, v. 7, Oct. 10, 1902, p. 10.)

With reference to locomotives. The system of "single-shovel" firing, as laid down by Sinclair in his booklet—"Burning soft coal without smoke," has been productive of good results.

***Sumner**, C. Hugh.
Coal consumption on locomotives. 1909. (In Engineering review, London, v. 21, p. 287-290.)

Economy of fuel rather than smoke prevention is object. Unskilful stoking and faulty boiler arrangements are given attention.

***Tests** in smoke abatement on Santa Fe switching locomotives. 6 diag. 1 dr. 1912. (In Railway age gazette, v. 52, p. 343-347.)

Condensed from bulletin 6 of Chicago Chamber of Commerce's "Committee of Investigation on Smoke Abatement and Electrification of Railway Terminals." Tests were made with Pocahontas and Illinois coal and analyses were made of ash and flue gases.

***Timmis** smoke and spark consuming system. 6 dr. 1907. (In Railroad gazette, v. 42, p. 110-111.)

Describes apparatus for application on locomotives. Air is forced in front end of firebox immediately below brick arch.

***Tschorn**, B.
Verhinderung von rauch- und russentwicklung. 11 dr. 1889. (In Zeitschrift des Vereines deutscher Ingenieure, v. 33, pt. 2, p. 820-822.)

Part of report on "Deutsche Allgemeine Ausstellung für Unfallverhütung," Berlin, 1889. Deals with locomotive spark arresters, and with firing of industrial furnaces.

***Verwertung** der lokomotivrauchkammerlösche. 150 w. 1910. (In Rauch und staub, v. 1, p. 57.)

Abstract from "Bayerisches industrie- und gwerbeblatt," 10 Sept., 1910, p. 369.

***Willard,** Z. A.

Final report on the smoke nuisance. 11 p. 1912.

History of anti-smoke campaign in Boston. Considerable reference to locomotive smoke, recommending, oil fuel. Includes author's paper at Smoke Abatement Conferences, 1912, entitled "Smoke problem in the United States of America."

***Willard,** Z. A.

Report on the smoke nuisance, 18 p. 1907.

Concerned mainly with extent of the nuisance caused by locomotive smoke and with means of abatement. Considers briefly anthracite, coke and crude petroleum as locomotive fuels, substitution of gasoline motors or electric locomotives. Regards smoke consuming devices, in present state of development, of little value and recommends replacing the steam locomotive by some other form of motive power.

***Willard,** Z. A.

Smoke problem in the United States of America. 1912. (In Papers read at the Smoke Abatement Conferences, March . . . 1912, p. 59-61.)

Summarizes conditions where bituminous coal is used. Use of oil fuel is touched upon.

***Woodruff,** Clinton Rogers.

Railroads and the smoke nuisance. 1909. (In Popular science monthly, v. 74, p. 153-160.)

Summarizes work of others without presenting original material to any great extent.

Concludes that "elimination of smoke nuisance, so far as the railroads are concerned, is feasible. Primarily it is a matter of proper firing and the use of the right sort of materials."

Steamboats

***Little,** W. N.

U. S. gunboats Dubuque and Paducah. 1905. (In Journal of the American Society of Naval Engineers, v. 17, p. 589.)

Gives (p. 628) brief remarks, and a number of photographs showing slight production of smoke during official trial.

***Pasinski,** v.

Bericht über die Rheinschiffahrts-Rauchkonferenz in Cöln am 9 Dezember 1911. 1912. (In Rauch und staub, v. 2, p. 83-85.)

***Pasinski,** v.

Rheinschiffahrt und rauchbelästigung. 1911. (In Rauch und staub, v. 2, p. 1-3.)

Efforts to secure diminution of smoke from Rhine steamers.

***Regulating** smoke on river steamboats within city limits. 1913. (In Engineering record, v. 67, p. 233-234.)

Investigation being made on the production of smoke on the Ohio River at Cincinnati. Combustion tests were made on boiler furnaces of river boats. Government investigation is recommended.

See also editorial, p. 225.

***Rheinrauchkonferenz** in Köln. 150 w. 1911. (In Rauch und staub, v. 2, p. 55.)

***[Ruff.]**
Kraftfahrzeuge und rauchbelästigung. 1911. (In Rauch und staub, v. 2, p. 66-67.)

Adapted from Ruff's paper "Ueber die technische prüfung der kraftfahrzeuge nach der bundesrats verordnung," in Zeitschrift für dampfkessel- und maschinenbau, 1911, p. 225-228, 245-247.

***Schleicher.**
Binnenschiffahrt und rauchbelästigung. 1911. (In Rauch und staub, v. 2, p. 72-73.)

Abstract from "Frankfurter zeitung," 6 Nov., 1911.
Largely a discussion of Pasinski's paper on conditions on the Rhine.

***Smith,** C. J.
Prevention of smoke; economy of fuel. 1860. (In Chemical news, v. 2, p. 82-83.)

Letter, advocating use of blast on board steamships for generating steam and preventing smoke, with editorial commendation of the suggestion.

Other special industries

***American Society of Mechanical Engineers.**
What have you found the best methods for removing gas and smoke from blacksmith shops? 1,200 w. 1887. (In Transactions of the American Society of Mechanical Engineers, v. 8, p. 697-699.)

Topical discussion. Various suggestions, some favoring prevention by using coke as fuel. Others cite cases of successful removal by artificial draft and proper arrangement of hoods.

***Bertelsmann,** W.
Die heutige leuchtgasindustrie und ihre beziehungen zur rauchfrage. 1912. (In Rauch und staub, v. 2, p. 338-343.)

***Beseitigung** von rauch und geruch von abgasen. 450 w. 1912. (In Rauch und staub, v. 3, p. 88-89.)

Notes on "Liebrecht-desodorator," made in Mannheim, mainly for exhaust of internal combustion engines, but said to be applicable also to prevention of smoke and soot from combustion of coal. Device is not described.

***Dreschmidt,** H.
Ueber verunreinigung der luft in den reinigungs- und regenerirhäusern der gasanstalten. 1897. (In Journal für gasbeleuchtung, v. 40, p. 517-520.)

Considers among harmful gases, hydrocyanic acid, ammonia, hydrogen sulphid and other sulphur compounds, and carbon monoxid.

***Gerold,** Oscar.
Rauch- und staubbekämpfung in giessereien und zugehörigen werkstätten. 5 dr. 13 ill. 1912. (In Rauch und staub, v. 3, p. 33-47.)

***Haldane,** J. S.
Relation of sulphur in lighting gas to air vitiation. 1903. (In Journal of gas lighting, v. 83, p. 564-565.)

Reprinted from "Journal of hygiene."
Concludes that, (1). "the unpleasantness of air vitiated by the products of combustion of lighting gas is due to the presence of sulphur in the gas and varies in proportion to the amount of sulphur" and that, (2). "gas which is purified from carbon bisulphide is greatly superior from the hygienic standpoint to gas which is only purified from sulphuretted hydrogen."

***Nicholls,** H. M.
Smoke prevention; a solution of the problem for heating furnaces in iron and steel working plants. 4 dr. 1910. (In Iron age, v. 86, pt. 2, p. 1157-1158.)

Advocates change of boiler setting, with introduction of hot blast into flue in direction of travel of the gases.

***Nietwärmöfen** mit rauchabführung. 200 w. 1 dr. 1 ill. 1911. (In Rauch und staub, v. 2, p. 73.)

***Problem** of smoke in the heating or melting furnaces. 1913. (In Industrial world, v. 92, n. s. v. 47, pt. 1, p. 146.)

Mentions a number of metallurgical plants which have reduced smoke by installation of stoker-fired furnaces.

***Rawlinso,** Robert and **Cousins,** Edward.
Brick smoke. 900 w. 1868. (In English mechanic and mirror of science and art, v. 7, p. 315.)

Report; finding that black smoke is unnecessary in brick manufacture.

***Sander.**
Die auspuffgase der automobilmotoren. 400 w. 1912. (In Rauch und staub, v. 3, p. 87.)

Abstract from "Technische monatshefte," 1912, no. 8, p. 248.

***Smoke** in the potteries. 500 w. 1867. (In English mechanic and mirror of science and art, v. 5, p. 389.)

***Über** die auspuffgase der automobile. 200 w. 1912. (In Rauch und staub, v. 2, p. 261.)

Abstract from "Bayerisches industrie- und gewerbeblatt," 1912, no. 11, p. 109.

***Vohl,** Herm.
Ueber die gase und dämpfe, welche sich bei der hier zu lande üblichen feldziegelei entwickeln. 1865. (In Dingler's polytechnisches journal, v. 178, p. 296-300.)

Considers gases given off at brickyards.

***Wolff,** G.
Bekämpfung der automobilauspuffplage. 1912. (In Rauch und staub, v. 2, p. 154-158.)

Nature and extent of nuisance, especially in Germany; and suggestions for abatement.

Composition and Properties of Smoke and Soot

See also Observation and measurement.

***Ascher,** Louis.
Luftuntersuchungen. 1910. (In Rauch und staub, v. 1, p. 78-80.)

Considers in part, soot and acids caused by imperfect combustion of coal.

***Callan,** Uno.
Ueber die bestimmung von schwefliger säure und schwefelsäure in den verbrennungsprodukten des leuchtgases. 1895. (In Zeitschrift für analytische chemie, v. 34, p. 148.)

On the determination of sulphurous and sulphuric acid in the combustion-products of illuminating-gas. Bibliographic foot-notes.

***Calvert,** F. Crace.
On the composition of the smoke from factories, compared with that from dwelling houses; and on their respective action upon vegetation and health. 1866. (In Transactions of the National Association for the Promotion of Social Science, v. 10, p. 440-442.)
Discussion, p. 571-573.

**The same.* (In Chemical news, v. 14, p. 194-195.)
Thinks the action of sulphurous acid content of vitiated air is much less harmful to vegetation than the "injury effected by the fixation of 'black smoke' or soot upon plants."

***Cohen,** Julius Berend.
Effects of coal smoke. 5 ill. 1911. (In Proceedings of the Conference of the Smoke Abatement League of Great Britain, Manchester, 21-22 Nov., 1911, p. 34-43.)
Composition of soot.—Acidity of soot.—Amount of soot emitted from chimneys.—Amount of solid impurities in the air.—Daily sootfall.—Solid impurities in rain water.—Deposit of soot-tar.—Sulphuric acid from coal and its effects on masonry and ironwork.—Effect of smoke on the intensity of daylight.

**The same, translated.* 1912. (In Rauch und staub, v. 2, p. 85-89.)

***Cohen,** Julius Berend.
Method of estimating the weight of solid matter in the air. 1 dr. 1897. (In Journal of the Society of Chemical Industry, v. 16, p. 411-412.)
Method made use of zig-zag tube coated with vaseline, through which air was aspirated, with cotton-wool plug as filtering medium. Amount of soot determined by weight.

***Cohen,** Julius Berend, & **Ruston,** Arthur G.
Soot: its character and composition. 1911. (In Journal of the Society of Chemical Industry, v. 30, p. 1360-1364.)

**The same, condensed.* (In Nature, v. 88, p. 598-599.)
Soots analyzed were taken from different parts of Leeds. Estimates are given of amounts of soot deposited and its effect on vegetation.

***Constam,** E. J. & **Schläpfer,** P.
Ueber den einfluss der fluchtigen bestandteile fester brennstoffe auf den wirkungsgrad von kesselanlagen mit innenfeuerung. 20 dr. 1909. (In Zeitschrift des Vereines deutscher Ingenieure, v. 53, pt. 3-4, p. 1837-1844, 1880-1887, 1929-1934.)
Deals to considerable extent with analysis of smoke and gases.

***Cramer,** Ed.
Die verbrennungswärme der gebräuchlichsten beleuchtungsmaterialien, und über die luftverunreinigung durch die beleuchtung. 1891. (In Journal für gasbeleuchtung, v. 34, p. 1-6, 27-31, 48-50, 65-68.)
Considers nature and amounts of impurities in air contaminated by combustion of illuminating materials. Carbon and hydrogen compounds are especially considered, and smaller quantities of nitric and nitrous acids, ammonia, sulphuric acid, etc.

***Dennstedt,** M. & **Ahrens,** C.
Ueber die bestimmung von schwefliger saüre und schwefelsäure in den verbrennungsproducten des leuchtgases. 1896. (In Zeitschrift für analytische chemie, v. 35, p. 1-10.)
Investigates proportion of sulphuric acid formed, and considers different analytical processes.

***Dennstedt, M. & Ahrens, C.**
Versuche mit leuchtgas. 1895. (In Zeitschrift für angewandte chemie, v. 8, p. 337.)
Condensed from paper before Deutsche Gesellschaft für angewandte Chemie. Discussion on whether the sulphur contained in illuminating gas is burned to sulphuric or sulphurous acid.

***Dennstedt, M. & Hassler, F.**
Einiges über russ- und rauchplage. 1907. (In Chemiker-zeitung, v. 31, p. 550-551.)
The same, abstract. 1908. (In Jahresbericht der Vereinigung für Angewandte Botanik, v. 6, p. 82-84.)
Comments on discovery of significant quantities of ammonium sulphate and sulphuric acid in soot from bituminous coal. Determines exact amount by analyses of snow. Finds the greatest damage from combustion of coal to be caused by sulphuric acid fumes, and concludes that "to avoid smoke it is necessary to increase the temperature of the furnace and to educate the fireman to better methods of firing."

***Englands** anorganische grossindustrie im jahre 1909. 1910. (In Zeitschrift für anorganische chemie, v. 23, pt. 2, p. 1674-1675.)
**The same, note.* 1910. (In Rauch und staub, v. 1, p. 25.)
Gives composition of industrial gases.

***Factory** smoke and house smoke, 1,000 w. 1867. (In English mechanic and mirror of science and art, v. 4, p. 273.)
Discusses papers of F. Crace-Calvert, and Spence.

***Fischer, F.**
Über untersuchung von rauchgasen. 1876. (In Zeitschrift des Vereines deutscher Ingenieure, v. 20, col. 313-315.)
Discusses various forms of apparatus, including that of Winkler, Liebig, and Orsat-Aron.

Flory, B. P.
Test of the amount of combustible in smoke. 1895. (In Sibley journal of engineering, v. 9, p. 338-340.)

***Frazer, J. C. W. & Hoffman, E. J.**
Apparatus and methods for the sampling and analysis of furnace gases. 22 p. 6 dr. 1911. (United States—Bureau of Mines. Bulletin 12.)

Freytag, Moritz.
Schädlichen bestandtheile des hüttenrauchs der küpfer- blei- und zinkhütten und ihre beseitigung. 4 fig. 1882. (In Landwirtschaftliche jahrbücher, v. 11, p. 315.)
Bibliographic foot-notes.
Considers visible injurious effects, constituents of smoke and fumes, and palliative measures.

***Gawalowski, A.**
Messrohr zur volumprozentischen prüfung von mischgasen, insbesondere rauchgasen. 6 dr. 1911. (In Zeitschrift für analytische chemie, v. 50, p. 435-439.)
Measuring-tube, on modified principle of Bunte burette.

***Harkins, W. D. & Swain, R. E.**
Determination of arsenic and other solid constituents of smelter smoke, with a study of the effects of high stacks and large condensing flues. 3 diag. 4 dr. 1907. (In Journal of the American Chemical Society, v. 29, pt. 2, p. 970-998.)
The same, abstract translation. 1907. (In Jahresbericht der Vereinigung für Angewandte Botanik, v. 6, p. 89-91.)

***Hartley,** W. N.
On some mineral constituents of a dusty atmosphere. 1911. (In Proceedings of the Royal Society of London, ser. A, v. 85, p. 271-275.)
**The same, abstract.* 200 w. 1911. (In Science abstracts, section A, v. 14, p. 455.)
**The same, abstract translation.* 300 w. 1911. (In Rauch und staub, v. 2, p. 53-54.)

Also in "Die städtereinigung," 1 Oct., 1911, p. 226.
Spectroscopic and photographic observations to determine composition of finest particles. As no atmosphere is free from dust, and city air is particularly dusty, the various mineral constituents must be regarded as possible reagents in cases where there is evidence that very minute quantities of basic substances can initiate chemical reactions.

***Hartley,** W. N. & **Ramage,** Hugh.
Mineral constituents of dust and soot from various sources. 1901. (In Proceedings of the Royal Society of London, v. 68, p. 97-109.)

***Hassenstein,** W.
Die hyperbeln der rauchgasbestandteile. 1911. (In Chemiker-zeitung, v. 35, p. 1250.)

Disputes practicability of László's formulas.

***Herbig,** W.
Rauchschäden durch dampfkesselfeuerungen. 1909. (In Zeitschrift für angewandte chemie, v. 22, pt. 2, p. 1882-1890.)

Determines sulphur dioxid in smoke from boiler fires, and finds that not all the sulphur in coal appears in this form.

Hurdelbrink.
Untersuchung der königsberger luft auf russ und schweflige säure. 2 diag. 1 ill. 1909. (In Deutsche vierteljahrsschrift für öffentliche gesundheitspflege, v. 41, p. 372-378.)

***Irwin,** Wilfrid.
Soot deposited on Manchester snow. 1902. (In Journal of the Society of Chemical Industry, v. 21, pt. 1, p. 533-534.)

***Kershaw,** John B. C.
Description of the methods of gas-sampling and testing employed by the Hamburg Smoke Abatement Society. 1 dr. 1909. (In Electrical review, London, v. 65, p. 656.)

Aspirator and testing apparatus used for determination of carbon dioxid and oxygen. A bonus system for rewarding careful firemen, is based on percentage of gases resulting from combustion.

***Kintner,** Samuel M.
Effect of steam and smoke on striking distance. 1 diag. 2 ill. 1906. (In Electric journal, v. 3, p. 237-240.)
**The same, abstract.* 1 diag. 1906. (In Street railway journal, v. 27, p. 863.)

Tests on conductivity of smoke.

***Knecht,** Edmund.
On some constituents of Manchester soot. 1905. (In Chemical news, v. 91, p. 259-261.)

From Memoirs and proceedings of the Manchester Literary and Philosophical Society.
Gives method of examination and extraction of constituents.

***Laktine,** P.
On the composition of smoke. 1893. (In Journal of gas lighting, v. 61, p. 1211-1212.)

Condensed translation from "Annales de la Société Technique Russe."
See also paper by Lochtin, Peter.

***Lang,** Herbert.
Smoke of metallurgical works. 1911. (In his "Metallurgy," v. 1, p. 188-215.)

Considers nature and composition of smoke from metallurgical works, its prevention, methods of precipitation and of utilization of heat and constituents of smoke.

***Lang,** Herbert.
Sulphur smoke. 1911. (In his "Metallurgy," v. 1, p. 216-248.)

Shows prevalence of sulphur in smelter and other fumes, and harmful effect on animal and plant life. Suggests methods for overcoming nuisance.

***László,** E.
Die hyperbeln der rauchgasbestandteile. 3 diag. 1911. (In Chemiker-zeitung, v. 35, p. 994-996.)

Works out mathematical equations for fuels consisting of carbon and hydrogen, showing relations between these two constituents and considering the necessary air for combustion.
See also paper by Hassenstein.

***Lochtin,** Peter.
Ueber die zusammensetzung des rauches. 1891. (In Dingler's polytechnisches journal, v. 280, p. 162-164.)
**The same, condensed.* 800 w. (In Chemiker-zeitung chemisches repertorium, v. 15, p. 157.)

Investigates composition of soot, especially that formed by combustion of wood, peat, oil fuel, etc.
See also paper by Laktine, P.

***Manchester Field Naturalists' Society**—Air Analysis Committee.
Air of large towns; methods of analysis. 2 dr. 1891. (In Transactions of the Seventh International Congress of Hygiene and Demography, v. 5, p. 22-27.)

Gives particular attention to estimation of sulphurous acid in the air and to general composition of soot deposits.

***Mr.** A. E. Fletcher on smoke prevention. 1889. (In Journal of gas lighting, v. 54, p. 208-209.)

Summarizes section of report of Chief Inspector under the Alkali Act. Concerned mainly with the presence of harmful gases and with the composition of smoke.

***Orsi,** Giovanni.
Über die quantitative bestimmung des russgehaltes der luft. 1909. (In Archiv für hygiene, v. 68, p. 10-21.)

500 liters of air were taken three times a day in different parts of Berlin to determine soot content. Methods of both Rubner and Weber were used. Rain was found to decrease amount of soot in air more than snow, while fog held it.

***Ost,** H.
Rauchgase der kesselfeuerung. 1909. (In Zeitschrift für angewandte chemie, v. 22, pt. 2, p. 2196-2197.)

Replies to Herbig's criticism of author's figures in previous article in regard to determination of sulphur dioxid in smoke gases.

***Ost,** H.
Schwefelsäuregehalt in rauchgasen. 1897. (In Zeitschrift für angewandte chemie, v. 10, p. 230-231.)

Brief consideration of content of sulphurous and sulphuric acids in smoke.

***Ost,** H.
Über den schwefelsäuregehalt in rauchgasen. 1897. (In Zeitschrift für angewandte chemie, v. 10, p. 230-231.)

***Ost,** H.—*continued.*

Abstract of paper before Hannoverscher Bezirksverein of the "Verein deutscher Chemiker."

Discusses composition of coal and of smoke.

***Ost,** H.

Verbreitung der schwefelsäure in der atmosphäre. 1 dr. 2 maps. 1900. (In Chemische industrie, v. 23, p. 292-296.)

Dissemination of sulphuric and sulphurous acids resulting from smoke. Careful tests of air of forest, plain and mountain.

***Recknagel.**

[Krellschen rauchgasanalysator.] 300 w. 1 dr. 1900. (In Zeitschrift des Vereines deutscher Ingenieure, v. 44, pt. 1, p. 157.)

Abstract of address, explaining this apparatus, before Bayerischer Bezirksverein.

***Rideal,** Samuel.

The acids of smoke. 2,000 w. 1906. (In Journal of the Royal Sanitary Institute, v. 27, p. 74.)

**The same.* 1906. (In Addresses, papers and discussions at Conference on Smoke Abatement, p. 30-35.)

Investigations of air of towns and country districts have shown that the amounts of sulphurous and sulphuric acids in the air always increase in foggy weather, and are normally present to a much greater extent in urban than in rural districts.

***Scholtes.**

Einen selbsttätigen rauchgas-analysator (bauart Krell-Schultze). 700 w. 1908. (In Zeitschrift des Vereines deutscher Ingenieure, v. 52, pt. 1, p. 349.)

***Thörner,** Wilh.

Beiträge zur untersuchung der verbrennungsproducte von dampfkesselfeuerungen. 1899. (In Chemiker-zeitung, v. 23, p. 331.)

Concerned particularly with amount of sulphur compounds in smoke and gases of combustion. Suggests mixing of lime with fuel as means of preventing formation of sulphur acids.

***Trillat,** A.

Sur la présence normale de l'aldéhyde formique dans les produits de combustion et les fumées. 1904. (In Comptes rendus hebdomadaires des séances de l'Académie des Sciences, v. 138, p. 1613-1615.)

Experiments show formaldehyde to be produced in all cases of combustion, and to be present to a greater or less extent in all smoke from industrial towns.

Economic Considerations. Loss Due to Smoke

See also Injurious effects. Smoke problem in special localities.

***Ashworth,** Daniel.

Losses in boiler practice and some of their causes. 1894. (In Proceedings of the Engineers' Society of Western Pennsylvania, v. 10, p. 197-210.)

With discussion.

Loss due to smoke is mentioned briefly in paper and touched on more fully in discussion.

Atkinson, A. S.

Economy of smoke abatement. 1906. (In Boiler maker, v. 6, p. 118-120.)

General résumé, considering briefly the advantages of pulverized and liquid fuel, stokers vs. hand-firing and the evil effects of soot.

***Atkinson,** A. S.

Economy of smoke abatement. Many cities getting rid of smoke nuisance. Black smoke a badge of bad engineering and management. Various devices employed. Good stokers in demand. 1907. (In Moody's magazine, v. 3, p. 706-710.)

***Bement,** Alburto.

Heat efficiency of smokeless combustion and heat-absorbing capacity of boilers. 1 diag. 6 dr. 1909. (In Transactions of the American Institute of Chemical Engineers, v. 2, p. 156-176.)

Takes up (1) efficiency of combustion in the case of water-tube boilers in connection with chain-grate stokers, with Illinois coal screenings as fuel, and (2) causes governing boiler efficiency.

***Benner,** Raymond C.

The cost of an industrial nuisance. 1913. (In American city, v. 8, p. 496-497.)

Considers the evils of smoke, mainly from the economic standpoint.

***Bryan,** William H.

Boiler efficiency, capacity and smokelessness with low grade fuels. 3,000 w. 1896. (In Journal of the Association of Engineering Societies, v. 17, p. 157.)

**The same.* 1,000 w. (In Engineering record, v. 35, p. 209.)

Claims that the performance of a boiler may be measured by the smoke produced.

***Dixon,** W. A.

Note on loss of heat by imperfect combustion. 300 w. 1894. (In Chemical news, v. 70, p. 248.)

Comment on paper by Tatlock (p. 51). Author claims that aside from the loss of unconsumed carbon, the production of smoke promotes waste by depositing a non-conducting coating on boiler and tubes and by the suspended smoke screening heat from the boiler.

***Einfluss** des russes in kesselröhren auf die verdämpfung. 1910. (In Rauch und staub, v. 1, p. 27.)

From "Rigasche industrie-zeitung," 1910, 15 Aug., p. 240.

Series of tests on efficiency of horizontal boiler, first, with accumulation of soot, and later with daily cleaning.

***Flagg,** Samuel B.

The dividends that float up the chimney; what smoke means in dollars and cents. 7 ill. 1912. (In Scientific American, v. 120, n. s. v. 106, p. 539-540.)

Popular article giving some figures of loss by smoke, and discussing use of Ringelmann smoke chart for determining density of smoke.

***Improving** fire-room efficiencies; details of boiler-room equipment at Rockford, Ill., for economical generation of steam. 2 ill. 1911. (In Electrical world, v. 58, p. 1369-1370.)

***Misslack,** Karl.

Eigentumbeschädigung durch rauch und schwefelgase. 250 w. 1913. (In Rauch und staub, v. 3, p. 203.)

Abstract from "Zeitschrift für dampfkessel und maschinenbetrieb," 1913, no. 13, p. 157.

***Owens,** John S.

Wasteful power production, with special reference to waste due to smoke. 2 diag. 1912. (In Papers read at the Smoke Abatement Conferences, March . . . 1912, p. 92-99.)

Touches on waste from unburnt gases, from coating of boiler plates and tubes with soot, from corrosive action of smoke, from inferior stoking and from presence of water in coal.

***Rolleston,** Charles.
The smoke plague. 1907. (In Westminster review, v. 168, p. 154-162.)

Devoted largely to figures showing damage in London.

***Smoke** error. 1909. (In Outlook, New York, v. 93, p. 6.)
Editorial statement of loss entailed by inhabitants of smoky cities.

***Smoke** nuisance. 1899. (In Builder, London, v. 77, p. 143.)
General discussion of waste from fuel loss and from damage caused by the smoke.

***Storie,** G. B.
Effect of smoke on boiler plant efficiency. 3 diag. 1911. (In Proceedings of the Conference of the Smoke Abatement League of Great Britain, Manchester, 21-22 Nov., 1911, p. 91-105.)

Appendix, p. 106-110.
Attempts to show that "prevention of smoke, if carried out on proper lines, will, instead of being a hindrance to trade, effect economy, and return to the boiler owner value in the shape of a more efficient plant."
Discusses causes of smoke and various features of proper combustion.

***Switzer,** J. A.
Economic aspects of the smoke nuisance. 8 diag. 5 ill. 1911. (In Tennessee—Geological Survey. Resources of Tennessee, v. 1, p. 170-181.)

**The same.* (In Scientific American supplement, v. 73, p. 153-155.)

Offers proof from cases personally observed by author that "smoke abatement is primarily a measure of economy."

***Tatlock,** R. R.
The heating power of smoke, 400 w. 1894. (In Chemical news, v. 70, p. 51.)

See also p. 269.

**The same.* (In American engineer and railroad journal, v. 68, p. 468-469.)

**The same.* (In Engineer, London, v. 78, p. 326.)

**The same.* (In Engineering and mining journal, v. 58, p. 152.)

**The same.* (In Scientific American supplement, v. 38, p. 15634.)

Results of experiments showing that loss of combustible matter in smoke is very small and that there is little or no gain in burning smoke.

***Wilson,** Herbert M.
Smoke worse than fire. 1911. (In American city, v. 4, p. 210-212.)

Estimates loss to inhabitants of American cities, due to smoke, in money, health and vitality.

***Woodruff,** Clinton Rogers.
Business man and the smoke nuisance. 1910. (In World to-day, v. 19, p. 1119-1124.)

Shows by quoting authorities that smoke means waste. Notes some evidences of progress in the campaign against smoke.

Observation and Measurement

See also Effect on atmospheric conditions.

***Aud,** William.
Praktische gebrauch der Ringelmannschen rauchskala. 150 w. 1910. (In Rauch und staub, v. 1, p. 27.)

Abstract from "Zeitschrift für praktischen maschinenbau," 8 June, 1910, p. 1184.
See also paper by Auld.

***Auld,** William.
Use of the Ringelman smoke scale. 5 diag. 1910. (In Power and the Engineer, v. 32, pt. 1, p. 848.)
Illustrates Ringelmann scale and tabulates some results of its use. See also paper by Aud.

***Bryan,** William H.
Tests of the Reynolds patent furnace. 600 w. Ill. 1894. (In Engineering record, v. 31, p. 65.)
Method of smoke estimation by plotting on cross section paper.

***Cary,** Albert A.
Smoke and the determination of its density. 6 diag. 4 dr. 1903. (In Transactions of the New England Cotton Manufacturers' Association, v. 74, p. 402-420.)
**The same, abstract.* (In Electrical review, New York, v. 42, p. 727-729, 774-775.)
Largely a discussion of smoke estimating and recording devices.

Density of smoke. 1892. (In Stationary engineer, v. 11, p. 94.)
Simple test by carbon deposit on white paper, wrapped around cold iron bar or water cooled pipe, and held in chimney.

***Donkin,** Bryan.
On smoke and its diminution. 8,000 w. Ill. 1899. (In Engineer, London, v. 87, p. 507, 531, 637.)
Deals at length with nature and measurement of smoke. Considers the work of various commissions and of smoke abatement societies .

***Fletcher,** Herbert.
Application of the simultaneous method of observing chimneys in Bolton and Oldham. 3 ill. 1894. (In Journal of the Sanitary Institute, v. 15, p. 751-758.)
Density of smoke on leaving chimneys is observed.

***Friese,** Walther.
Staubzählungen mit hilfe des Aitkenschen staubzählers. 1912. (In Rauch und staub, v. 2, p. 147-150.)
"Literatur," p. 150. (Twelve references.)

***Fritzsche,** P.
Bestimmung der rauchdichte nach der farbe. 1 dr. 1897. (In Zeitschrift des Vereines deutscher Ingenieure, v. 41, pt. 2, p. 885-886.)

***Fritzsche,** P.
Colorimetrische rauchdichtebestimmung. 1898. (In Zeitschrift für analytische chemie, v. 37, p. 92-94.)
**The same, condensed translation.* 200 w. (In Chemical news, v. 77, p. 249.)
For determining the density of smoke, the air is drawn through a glass tube containing a filtering material. The filtering material is later washed out, shaken with a definite volume of water, which becomes of a grayish color. By comparison of this with a standard scale, the density of the smoke is estimated.

***Fyfe,** Peter.
Excerpt from the report of the Sanitary Department of the City of Glasgow with reference to smoke prevention. 2 diag. 1 dr. 1900. (In Journal of the West of Scotland Iron and Steel Institute, v. 8, p. 17-21.)
Reviews work of chimney observation and recommendation of suitable forms of boilers.

***Gebhardt,** G. F.
Ringelmann smoke chart. 4 dr. 1910. (In his "Steam power plant engineering," ed. 3, appendix B, p. 843-844.)
Brief description.

Gerlach.
Ein apparat zur qualitativen und quantitativen ermittlung der aus industriellen etablissements usw. entweichenden sauren rauch- und abgase. 1908. (In Jahresbericht der Vereinigung für Angewandte Botanik, v. 6, p. 74-75.)
Abstract from "Allgemeine forst- und jagd- zeitung," May, 1907.

***Gerlach,** C.
Die ermittelung des säuregehaltes der luft in der umgebung von rauchquellen und der nachweis seines ursprungs. 29 p. 4 dr. 1909. (Sammlung von abhandlungen über abgase und rauchschäden, no, 3.)

Gemünd.
Beurteilung der intensität der rauch- und russplage unserer städte mittels des Aitkenschen staubzählers. 1907. (In Gesundheits-ingenieur, v. 30, p. 21-27.)
**The same.* (In Journal für gasbeleuchtung, v. 50, p. 257-258.)

Heim, L.
Nachweis von russ in der luft. 4 ill. 2 tables. 1896. (In Archiv für hygiene, v. 27, p. 365-383.)

***Kershaw,** John B. C.
Eine neue methode zur messung der rauchdichte von fabrikschornsteinen. 1911. (In Rauch und staub, v. 2, p. 3-4.)
Translated. Discussion of Owens's method.

***Kershaw,** John B. C.
Methoden zur bestimmung und aufzeichnung der in der atmosphäre enthaltenen verunreinigungen von staub und russ. 4 dr. 1913. (In Rauch und staub, v. 3, p. 193-197.)
Translation.

***Kershaw,** John B. C.
Smoke prevention in the modern power station. 3,000 w. 1906 (In Power, v. 26, p. 141.)
Urges careful temperature tests and gas analyses. Presents importance of chemistry in the boiler house.

Kister.
Bericht über die in Hamburg ausgeführten rauch- und russuntersuchungen. 1909-10. 46 diag. 6 ill. 2 maps. (In Gesundheits-ingenieur, v. 32, p. 841-850; v. 33, p. 30-44.)
Exhaustive study, participated in by Messrs. Korn, Koch, Nies and Liefmann. Discusses hygienic effects, and injurious influence on plant growth. Observations of atmospheric transparency were made at a large number of stations, smoke determinations being made by the filter paper method of Renk.
"Literatur," v. 33, p. 44. (21 references.)

***Kunze,** Edward J.
Smoke density determination. 1 dr. 2 diag. 1908. (In Engineer, Chicago, v. 45, p. 180-181.)
Mentions difficulties in determining density of smoke by color and describes Kunze smoke meter.

***Kunze,** Edward J.
Smoke suppression. 4 diag. 1 ill. 1908. (In Engineer, London, v. 105, p. 109-110.)

***Kunze,** Edward J.—*continued.*

Considers particularly use of Ringelmann smoke chart and of smoke gage devised by author for use with Ringelmann charts.

Liefmann, H.

Über die nachweis von russ in der luft. Habitationsschrift einer hohen medizinischen fakultät der Vereinigten Friedrichs-Universität Halle-Wittenberg. 31 p. 1 table. 1907.

***Lovibond,** Joseph W.

On precautions necessary for making reliable observations on smoke densities. 1,600 w. 1906. (In Journal of the Royal Sanitary Institute, v. 27, p. 169.)

******The same.* 1906. (In Addresses, papers and discussions at the Conference on Smoke Abatement, p. 97-100.)

Considers use of tintometer-equivalent color-scales, by means of which any degree of blackness can be matched and quantitatively recorded.

***Owens,** John S.

Smoke abatement; the possibility of establishing a new standard of smoke emission for factory chimneys. 1911. (In Engineering, v. 92, p. 370-371.)

******The same.* (In Canadian engineer, v. 22, p. 553-555.)

******The same.* (In Mechanical engineer, v. 28, p. 316-318.)

******The same, condensed.* In Engineering magazine, v. 42, p. 279-282; v. 43, p. 938-940.)

Paper before British Association for the Advancement of Science. Standard suggested is one of maximum density for maximum time of emission.

***Owens,** John S.

Some aspects of the smoke measurement problem. 1909. (In Papers read at the Smoke Abatement Conferences at Sheffield, March, 1909, p. 76-81.)

Describes scales for comparison of shade of smoke and instruments for observation and for sampling gases and solids escaping from chimneys. Suggests standardization of methods

***Owens'** smoke-density indicator. 300 w. Ill. 1912. (In Mechanical engineer, 5 July, v. 30, p. 10-11.)

***Pattison,** Hugh.

Laboratory on wheels. 1912. (In Municipal engineering, v. 43, p. 372-375.)

Describes arrangements of travelling laboratory for determining composition of chimney gases and of atmosphere in different parts of Chicago.

***Perkins,** Frank C.

Electric smoke recorder. 1 ill. 1913. (In Industrial world, v. 92, n. s. v. 47, pt. 1, p. 142.)

Eddy recorder, developed in Chicago. "Motor-driven device said to show the fireman a continuous 'moving picture' of the color of the smoke at the top of his stack, and give him warning when to watch his flue gases."

***Queens,** S.

Apparat zur bestimmung der durchsichtigkeit des rauches. 250 w. 1912. (In Rauch und staub, v. 2, p. 293.)

Abstract from "Der mechaniker," 1912, no. 11, p. 125-126.
Small optical device, for determining solid content of smoke from industrial chimneys if diameter of chimney be known.

***Rebs.**
[Versuche mit rauchschwacher kesselfeuerung.] 1 diag. 2 dr. 1906. (In Zeitschrift des Vereines deutscher Ingenieure, v. 50, pt. 2, p. 1512-1513.)

Tests of density of smoke with various methods of firing.

Ringelmann, Max.
Méthode d'estimation des fumées produites par les foyers industriels. 1898. (In Revue technique, v. 19, p. 268-271.)

***Ringelmannsche** verfahren zum messen der rauchstärke industrieller feuerungsanlagen. 6 diag. 1911. (In Rauch und staub, v. 1, p. 212-216.)

Experiences with Ringelmann's smoke chart, and illustrations of chart.

***Sanitary Institute of Great Britain.**
Smoke experiments. 70 dr. 1901. (In Transactions of the Sanitary Institute, v. 22, p. 388-396.)

Records of observations made by Committee appointed to test exhaust chimney cowls and terminals. Distribution of smoke issuing therefrom is shown by numerous sketches.

***Smoke** density indicator. 4 dr. 1900. (In American electrician, v. 12, p. 426-427.)

Describes device of the Austrian Society of Steam Boiler Owners at the Paris Exhibition. This allows the fireman, by inspection, to regulate the admission of air for combustion.

***Smoke** measurements. The Ringelmann smoke chart. 500 w. Ill. 1899. (In Transactions of the American Society of Mechanical Engineers, v. 21, p. 96.)

Appendix to report of Committee on revision of standard code for conducting steam boiler trials.

***Smoke** problem. 800 w. 1913. (In Canadian engineer, v. 24, p. 467-468.)

Editorial, approving systematized investigation of degree of atmospheric pollution in Canadian cities. Favors standardized method adopted in England.

***Smoke** tintometer, constructed by Mr. John Lowdon. 1 ill. 1909. (In Engineering, v. 88, p. 627.)

Instrument intended for determining density of smoke and defining it in standard terms.

***Strong,** W. W.
Ueber die wissenschaftliche behandlung der rauchfrage. 1911. (In Rauch und staub, v. 2, p. 65-66.)

Translation.
Discussion of standards of smoke density.

***Thomson,** William.
On an automatic appliance for recording the presence and density of black smoke in factory chimneys. 1892. (In Journal of the Society of Chemical Industry, v. 11, p. 12.)

Apparatus based on density of deposit left on small sheet of paper.

***United States**—Geological survey.
Ringelmann's scale for grading the density of smoke. [1910.]

Folding chart, 12" x 26". Shows scale for densities corresponding to 20, 40, 60 and 80 per cent. black smoke. Brief directions for use.

***Vorrichtungen** zur rauchverzehrung. 21 dr. 1895. (In Dingler's polytechnisches journal, v. 296, p. 224-233, 248-254.)

Condensed from report of Centralverband der preussischen Dampfkessel-Ueberwachungsvereine. Considers devices for determining density and composition of smoke. Describes the Kowitzke, Chubb, Stauss, Kuhn, Schomburg, Donneley, and Ruthel smoke-preventing apparatus.

***Wattles** stoking register. 1 ill. 1910. (In Iron age, v. 86, pt. 1, p. 175-176.)

Apparatus is designed to give automatically a photographic record of density of smoke in a chimney during each minute of the 24 hours.

Effects of Smoke

Beneficial effects. Utilization of smoke and its products. Impracticability of prevention

***Böhm-Raffay.**

Ein neues verfahren zur vollständigen beseitigung und unterdrückung des schornsteinrauches. 1902. (In Zeitschrift des Oesterreichischen Ingenieur- und Architekten-Vereines, v. 54, pt. 1, p. 447-449.)

Concerned mainly with description of process of d'Altoff for filtering smoke through porous material saturated with hydrocarbons. A fuel gas, "pyro-gas," is obtained. Considers the cost, feasibility and carrying out of process.

***Climate** in the treatment of disease. 1911. (In Encyclopædia Britannica, Ed. 11, v. 6, p. 526-527.)

Mentions salutary effect of London smoke in cases of asthma.

***Delépine,** Sheridan, & **Gomess,** Alfred B.

Demonstration of the possibility of removing the smoke of fires from the air of towns, and of using it for disinfecting sewers. 1 dr 1891. (In Transactions of the Seventh International Congress of Hygiene and Demography, v. 5, p. 37-39.)

**The same, condensed.* (In Industries, v. 11, p. 355.)

Object is to utilize disinfectant properties of smoke.

***Freeland,** W. H. & **Renwick,** C. W.

Smeltery smoke as a source of sulphuric acid. 4 dr. 8 ill. 1910. (In Engineering and mining journal, v. 89, p. 1116-1120.)

Injurious gases from copper smelting works, successfully utilized for commercial production of sulphuric acid.

***Guarini,** Emile

Industrial utilization of smoke. 1 dr. 1903. (In Scientific American supplement, v. 55, p. 22753-22754.)

Smoke gases are saturated with hydrocarbon or alcohol vapors, to be used later as gaseous fuel, ("pyrogas"). By another system, the gases are condensed in lumps of coke, saturated with hydrocarbons.

***Hoadley,** J. C.

London smoke. 1883. (In American machinist, v. 6, Dec. 22, p. 1-2.)

Considers loss from smoke overestimated. Investigates ratio between unburned carbon in black smoke and total amount of coal.

***Das Hodgkinsonsche** verfahren der salzgewinnung und die rauchplage. 1911. (In Rauch und staub, v. 1, p. 233.)

Brief note on process for utilization of exhaust steam and waste gases. Said to minimize smoke, and greatly increase production of salt.

***King,** F. H.
The fuel problem, building and textile materials. 1911. Ill. (In his "Farmers of forty centuries, or permanent agriculture in China, Korea and Japan," p. 137-166.)

Describes economical domestic use of fuel especially use of brick "kangs," or horizontal passageways for smoke, serving to heat houses. The coarse brick become porous after three or four years of service, and must be renewed, but, due to absorption of products of combustion, the brick become a valuable fertilizing material. Composition of soot is given with comment on its fertilizing value.

***Law** and practice of smoke prevention. 1898. (In Journal of gas lighting, v. 72, p. 1284.)

Argues that with the demand for steam uncertain, smokeless combustion of cheap coals is impossible.

***Lucke,** Charles E.
Influence of central-station loads on smoke production. 8 diag. 1907. (In Power, v. 27, p. 150-155.)

Conclusion is that, with present knowledge of coal-burning plants, continuous smokeless combustion is impossible with rapid load fluctuations.

***Metcalf,** William.
On smoke. 1892. (In Proceedings of the Engineers' Society of Western Pennsylvania, v. 8, p. 23-49, 53-57.)

**The same, condensed.* (In Iron age, v. 49, p. 447-448.)

With discussion by H. K. Porter, W. E. Koch, F. C. Phillips, R. S. Sutton, A. Dempster, W. P. Rend, A. E. Hunt, J. W. Langley, W. H. Daly, C. W. Townsend, C. F. Jahn, C. Smith, P. Barnes, M. J. Becker, C. Hyde, D. Ashworth, J. M. Bailey, C. B. Albree, T. P. Roberts, R. L. Walker, T. H. Johnson, F. Z. Schellenberg, J. Eichbaum, J. McDonald and J. H. Harlow.

Paper presents the view that smoke is not injurious to health and that smoke prevention in an iron manufacturing region is impracticable. Discussion touches many points on the feasibility of smoke abatement, and results in appointment of a "Committee on Smoke Prevention" of the Engineers' Society of Western Pennsylvania.

***Novel** smoke consumer. 1902. (In Scientific American, v. 86, p. 42.)

Brief note on proposal of d'Altoff for formation of combustible gas ("pyro-gas"), by filtration of smoke through porous material saturated with liquid hydrocarbons.

***Smoke.** 1898. (In Engineer, London, v. 86, p. 569-570.)

Editorial, arguing that smoke is inevitable and that "to be free from smoke a city must have no factories and no open fires."

***Soot.** 1911. (In Encyclopædia Britannica, v. 13, p. 754; v. 17, p. 616; v. 25, p. 417.)

Very brief notes on composition and value as fertilizer.

***Steely,** James E.
Ammonia from soot. 1909. (In Power and the engineer, v. 31, p. 929.)

Ammonia is believed to result from distillation, during combustion, of nitrogen in coal. Estimates that over four tons of ammonium sulphate, could be produced as by-product in plant using daily 100 tons of coal, containing 1% of nitrogen and 2% of sulphur.

***Utilising** smoke from wood. 1882. (In Knowledge, v. 2, p. 264.)

Abstract from Boston Courier, describing utilization of smoke from charcoal pits to produce acetate of lime, alcohol, tar and gas.

*Utilizing coal smoke. 100 w. 1911. (In Iron trade review, v. 48, p. 145.)

**The same, translated.* 1911. (In Rauch und staub, v. 1, p. 201.)

Note on Belgian device. Smoke driven by fan, through porous filter over which alcohol, petroleum, benzene, or other liquid hydrocarbon flows continuously. Smoke is suppressed, filter yields gas of high calorific value, and filtering material becomes good combustible.

Injurious effects

Effect on atmospheric conditions.

Dust. Fog

Aitken, John.

Dust, fog and clouds. 1881. (In Proceedings of the Royal Society of Edinburgh, v. 11, p. 122-126.)

Repetition of earlier experiments, showing condensation with dusty air, but none with filtered air.

***Aitken,** John.

On dust, fogs and clouds. (In Transactions of the Royal Society of Edinburgh, 1883, v. 30, p. 337-368.)

On account of affinity between dust particles and vapor, each dust particle tends to take the same amount of vapor. This tends to equality in the size of cloud particles and tends to prevent formation of larger drops by collision and union of cloud particles. As a result, the condensed vapor cloud instead of falling in minute parts as rain, tends to fall as a whole. The air becomes so loaded with the water held in mechanical suspension that it is dragged downwards by its weight, causing fogs.

Aitken, John.

On improvements in the apparatus for counting the dust particles in the atmosphere. 4 pl. 1889. (In Proceedings of the Royal Society of Edinburgh, v. 16, p. 135-171.)

Includes data on dissemination of products of combustion from gas jets, and accurate determination of presence and amount. Author has determined that with each puff of a cigarette a smoker sends into the air "4,000,000,000 particles more or less."

***Aitken,** John.

On some nuclei of cloudy condensation. 1 pl. 1898. (In Transactions of the Royal Society of Edinburgh, v. 39, p. 15-25.)

Part 1. Ions and cloudy condensation; part 2. Sunshine and cloudy condensation.

Aitken, John.

On some observations made without a dust counter on the hazing effect of atmospheric dust. 1 pl. 1893. (In Proceedings of the Royal Society of Edinburgh, v. 20, p. 76-93.)

"It may appear to some after reading it that a shorter and better title would have been 'On the hazing effect of smoke,' but . . . as this paper is a continuation of previous work . . . it would be better to keep to the use of the same terms."

Report of careful observations to determine state of upper atmosphere, above purely local pollution.

***Aitken,** John.

On the formation of small clear spaces in dusty air. 14 dr. 1884. (In Transactions of the Royal Society of Edinburgh, v. 32, p. 239-272.)

**The same, abstract, without dr.* 1884. (In Nature, v. 29, p. 322-324.)

Describes extensive experiments on effects of temperature, moisture, centrifugal force, and electricity.

Aitken, John.

On the number of dust particles in the atmosphere of certain places in Great Britain and on the Continent, with remarks on the relation between the amount of dust and meteorological phenomena. 3 pl. 1890. (In Proceedings of the Royal Society of Edinburgh, v. 17, p. 193-254.)

Exhaustive tests with dust-counting apparatus devised by author, show that air pollution by artificial agencies is widely distributed and extends to considerable elevations, (Paris, over 1,000 ft.) Shows that there is an affinity between dust in the atmosphere and water vapor, and that some kinds of dust condense vapor in unsaturated air. No evidence that humidity alone, apart from dust has any effect on atmospheric transparency. Discusses haze, fogs and wind.

Aitken, John.

On the particles in fogs and clouds. 1893. (In Proceedings of the Royal Society of Edinburgh, v. 19, p. 260-263.)

Abstract. Fog particles in pure air act like cloud particles, and some fogs clear away by raining themselves out of existence. But in town fogs, conditions are complicated by impurities in air due to combustion of coal and to other causes. Concludes that it is not so much the number as the composition of the particles caused by combustion, which causes the density and persistence of town fogs.

***Aitken,** John.

Report on atmospheric dust. 1 ill. 1902. (In Transactions of the Royal Society of Edinburgh, v. 42, p. 479-489.)

Deals with hazing effect of dust, and author's apparatus for counting dust particles. Discusses work of other observers on atmospheric dust.

***Allen,** S. J.

Radioactivity of a smoke-laden atmosphere. 1908. (In Physical review, v. 26, p. 206-208.)

**The same, abstract.* 1908. (In Science, v. 50, n. s. v. 27, p. 563-564.)

Abstract of paper at Chicago meeting of American Physical Society and American Association for the Advancement of Science, 30 Dec., 1907 —2 Jan., 1908.

Observations on rate of decay of radioactivity of smoky air at Cincinnati during eight months.

***Allen,** S. J.

Radioactivity of a smoke-laden atmosphere. 9 diag. 1908. (In Physical review, v. 26, p. 483-496.)

Results of a year's observation at Cincinnati. Comparison with results in several other cities.

"Curves of decay for the excited activity of the atmosphere, where large quantities of smoke particles are present, will show many irregularities, but may be analyzed into component parts, which agree with the rates of decay of the excited activities of . . . radium, thorium, and possibly actinium."

***Analysis** of the air of large cities. 1891. (In Industries, v. 10, p. 91.)

Note on analytical scheme of a committee of the Manchester Field Naturalists' Society.

***Bailey,** G. H.

Air of large towns. 1893. (In Science, v. 22, p. 201-202.)

Considers composition of town air and the prevalence and effect of fog and smoke.

***Bell,** J. Carter.

Noxious vapors which pollute the air. 11 p. 1887. (Manchester and Salford Noxious Vapours Abatement Association. Lectures on air pollution, no. 1.)

Discusses constituents of smoke and industrial gases, and injurious effects thereof.

***Benedict,** Francis Gano.

Composition of the atmosphere with special reference to its oxygen content. 115 p. 2. ill. 1912. (Carnegie Institution of Washington. Publication 166.)

Concerned mainly with pure air, but, by way of comparison gives data on street air and subway air considering very briefly effect of fog and smoke.

***Bolton,** R. P.

Fuel consumption and the climate of cities; a study of the effect of fuel consumption in New York City upon temperature and rainfall. 1911. (In Engineering magazine, v. 41, p. 987-990.)

**The same.* (In Engineering news, v. 66, p. 93-94.)

**The same.* (In Scientific American supplement, v. 73, p. 139.)

Extract from presidential address before the American Society of Heating and Ventilating Engineers.

Brodie, Frederick J.

Decrease of fog in London in recent years. 2 diag. 1905. (In Quarterly journal of the Royal Meteorological Society, v. 31, p. 15-28.)

With discussion.

Data showing steady decrease of fog since 1890. Author thinks result is largely due to substitution of gas for coal fuel. Commends work of Coal Smoke Abatement Society. Discussion brings out relation of smoke to fog.

Brodie, Frederick J.

On the prevalence of fog in London during the 20 years 1871 to 1890. 1891. (In Quarterly journal of the Royal Meteorological Society, v. 18, p. 40-45.)

With discussion.

Shows steady increase in fog up to 1890. Discussion shows tendency to attribute this to coal smoke.

Carpenter, Alfred.

London fog inquiry, 1901-'02. Report to meteorological council. 27 p. Many diag. and maps. 1903.

"Fogs largely attributable to smoke were permanent or at least of daily occurrence in some parts of London in the winter . . . The obscurity was certainly due chiefly to smoke for out of . . . 25 days . . . only nine can be legitimately classed as days of fog."

***Carpenter,** Alfred.

London fogs. 1880. (In Journal of the Society of Arts, v. 29, p. 48-60.)

With discussion.

Claims that intense fogs are caused by smoke which is "an unnecessary adjunct to fire." Favors gas for heating and suggests prohibiting sale of coal "in the metropolitan district, unless it had been previously deprived of its smoke-producing quality." Suggests also a tax on fireplaces not so constructed as to consume their own smoke. Discussion by Tracey and others produced testimony that London fogs were not increasing appreciably in density, and that they have a beneficial effect in neutralizing the noxious effluvia arising from the present (1880) system of drainage.

***Cohen,** Julius Berend.

The air of towns. 2 fig. 21 pl. 1896. (In Annual report of the Board of Regents of the Smithsonian Institution . . . to July, 1895. v. 50, pt. 1, p. 349-387.)

Lectures with illustrative experiments showing impurities and their harmful effects. Argues that fuel can be burned smokelessly and gives list of firms operating their plants without smoke. Little attention to mechanical features of smoke prevention. Refers particularly to conditions in Leeds.

***Cohen,** Julius Berend.

Nature and extent of air pollution by smoke. 2 diag. 1910. (In Journal of gas lighting, v. 112, p. 202-204.)

Lecture before Yorkshire Junior Gas Association.

***Cohen,** Julius Berend, & **Ruston,** Arthur G.

Nature and extent of air pollution by smoke. 2 diag. 1909. (In Nature, v. 81, p. 468-469.)

Abstract of paper before Health Congress at Leeds.
Records atmospheric impurities carried down by rain and effect of this rain water on vegetation.

***Cohen,** Julius Berend, & **Ruston,** Arthur G.

Smoke; a study of town air. 88 p. Il. 1912.

**The same, review.* 1912. (In Rauch und staub, v. 2, p. 238.)

Confined almost wholly to the collection of data on results of the imperfect combustion of coal. Studies the composition and amounts of impurities in air and considers effect of different impurities on vegetation, intensity of sunlight and public health in general. Investigations were made mainly at Leeds, England, on atmospheric conditions of a manufacturing town.

***Effect** upon sunshine records of the smoke of great cities. 1911. (In Encyclopædia Britannica, ed. 11, v. 26, p. 109-110.)

***Esmarch,** E. von.

Vergleichende untersuchungen über den rauch- und russgehalt verschiedener städte. 1911. (In Rauch und staub, v. 1, p. 247-248.)

Data showing condition for different parts of the year in 27 German cities.

***Evans,** W. A.

Smoke prevention. 1909. (In Illinois—State Geological Survey. Bulletin 14, p. 333-337.)

Address before Illinois Fuel Conference.
Author is (1909) Commissioner of Health, Chicago. Discusses smoke as a factor in air pollution and in disease.

***Eve,** A. S.

Effect of dust and smoke on the ionization of air. 1 diag. 2 dr. 1910. (In Philosophical magazine, v. 235, p. 657-673.)

Concludes that presence of dust, smoke or mist in air causes a transformation from small to large ions and that the total number of ions present may be increased, while the conductivity is diminished. This must have an important influence on the production of thunderstorms.

***Fog.** 1898. (In Ironmonger, v. 85, p. 438.)

**The same, condensed.* (In Journal of gas lighting, v. 72, p. 1351.)

Editorial, suggesting sprinkling about of small quantity of ammonia as neutralizer of corrosive acids of smoke and fogs.

***Frankland,** E.

On the transport of solid and liquid particles in sewer gases. 1877. (In Proceedings of the Royal Society of London, v. 25, p. 542-545.)

Discusses Tyndall's theory, (that heated and rarefied air passes by convection upward among the inert foreign particles which are not equally lightened) and cites his own observations and experiments in support of theory that much of the suspended matter in London air is water and other solid and liquid matter which is volatilized by a moderate degree of heat.

***Fyfe,** Peter.

Air pollution in Glasgow and other towns in Scotland. 1 diag. 1911. (In Proceedings of the Conference of the Smoke Abatement League of Great Britain, Manchester, 21-22 Nov., 1911, p. 79-88.)

***Fyfe,** Peter—*continued.*

Discussion, p. 88-90.
By Chief Health Inspector of Glasgow.
Diagram shows in cwts. per acre per annum the fall of hydrocarbons = grease; carbonaceous matter = soot; and mineral matter = grit, in 21 Scottish towns.

***Howarth,** E.

Records of sunshine. 1909. (In Papers read at the Smoke Abatement Conferences at Sheffield, March, 1909, p. 48-49.)

Tables show annual averages of bright sunshine for seaside places, residential towns and manufacturing towns.

***Lempfert,** R. G. K.

Sunshine records; a comparison of sunshine statistics for urban and rural stations. 1912. (In Papers read at the Smoke Abatement Conferences, March . . . 1912, p. 23-28.)

Comparison of recent with earlier figures shows a certain diminution of fog in London. Comparative statistics for London and other large towns are given.

***London** smoke. 1889. (In Engineer, London, v. 68, p. 333-334.)

Editorial, discussing effect of smoke on the composition of London fogs.

***McAdie,** Alexander G.

Conservation of the purity of the air—prevention of smoke. 1,200 w. 2 ill. 1910. (In United States—Weather Bureau. Monthly weather review, v. 38, pt. 2, p. 1423-1424.)

General statement of amount of impurities due to dust in the air of industrial cities.

***Parkes,** Louis C.

Air and water of London: are they deteriorating? 1892. (In Transactions of the Sanitary Institute, v. 13, p. 59-69.)

Believes London air to be becoming more impure, and advocates use of gas for domestic heating.

***Poore,** G. V.

Light, air and fog. 1883. (In Transactions of the Sanitary Institute, v. 14, p. 13-39.)

Cause, conditions and effect of dense smoke fogs on health are considered. Continued fogs are shown to cause greater pollution of atmosphere with longer duration.

***Primrose,** John Ure.

A plea for a systematic comparative analysis of the air of towns and a consolidation of the law dealing with smoke emissions. 2,800 w. 1906. (In Journal of the Royal Sanitary Institute, v. 27, p. 215.)

**The same.* 1906. (In Addresses, papers and discussions at the Conference on Smoke Abatement, p. 117-123.)

Favors establishment of standard of purity for town air, and considers desirable legislation regarding smoke production.

***A purified** London air. 1 diag. 1910. (In London Times, Dec. 27, 1910, p. 11.)

Gives information concerning the decrease in prevalence and intensity of heavy smoke fogs. Considers it due largely to enforcement of smoke prevention acts and to increased use of gas as fuel.

***Ransome,** A.

Pure air and how to obtain it. 13-25 p. 1887. (Manchester and Salford Noxious Vapours Abatement Association. Lectures on air pollution, No. 2.)

Deals with properties of pure air, and sources of air contamination.

***Rawnsley,** H. D.
Sunlight or smoke? 1890. (In Contemporary review, v. 57, p. 512-524.)

Deals with factory smoke in England, describing a trip on which many smoky plants were observed.

***Rayleigh,** John William Strutt, *baron.*
On the dark plane which is formed over a heated wire in dusty air. 1 diag. 1882. (In Proceedings of the Royal Society of London, v. 34, p. 414-418.)

**The same.* 1882. (In Nature, v. 28, p. 139-140.)

Describes author's experiments, (on segregation of smoke) which he considers inconclusive, but which led him to disagree with Tyndall's theory of the dark plane and to attribute less importance to lightening of the air by heat. He differs also with Frankland's view that the foreign matter is volatilized. The smoke generally used for these observations was from smoldering brown paper, but other substances were tried to some extent.

Renk, Friedrich.
Die luft. 242 p. 27 diag. 1886. (In Handbuch der hygiene und der krankheiten, hrsg. von M. v. Pettenkofer und H. v. Ziemssen, 1. theil. 2. abtheilung. 2. heft.)

Careful, comprehensive study of air of various regions. Considers in detail the chemical composition, and physical properties, discusses nature of impurities and considers air in relation to health.

***Rubner,** Max.
Über trübe wintertage nebst untersuchungen zur sog. rauchplage der grossstädte. 1906. (In Archiv für hygiene, v. 57, p. 323-378; v. 59, p. 91-149.)

The same, abstract. 1908. (In Jahresbericht der Vereinigung für Angewandte Botanik, v. 6, p. 100-101.)

**The same, abstract translation.* 1907. (In Chemical abstracts, v. 1, pt. 1, p. 215-216.)

Treats subject comprehensively under nine headings: darkening of atmosphere of cities; use of coal and other fuel; fuel for homes and factories; soot production; soot content of city atmosphere; proportion of gases present and influence of smoke on composition of atmosphere; occurrence of sulphurous acid; nitrates and nitrites in air; and optical conditions and climatic effects.

***Russell,** Francis Albert Rollo.
The atmosphere in relation to human life and health. 1896. (In Annual report of the Board of Regents of the Smithsonian Institution . . . to July, 1895. v. 50, pt. 1, p. 203-348.)

Discusses effect of atmospheric conditions on mental and physical vigor.

"Fog, smoke, gaseous and solid impurities in the air," p. 231-250.

***Russell,** Francis Albert Rollo.
Smoke in relation to fogs in London. 1888. (In Nature, v. 39, p. 34-36.)

"Abstract of address delivered . . . March 1, 1888, under the auspices of the Smoke Abatement Institution."

Author states that "if London were to cease using fuel in the solid form, it would be as free from fog as the surrounding country." Discusses the economic disadvantage and the "moral reaction" of smoke and fog.

See also editorial, p. 25.

***Russell,** Rollo.
The artificial production of persistent fog. 3,800 w. 1906. (In Journal of the Royal Sanitary Institute, v. 27, p. 152.)

***Russell,** Rollo—*continued.*

**The same.* 1906. (In Addresses, papers and discussions at the Conference on Smoke Abatement, p. 80-87.)

"Dark fogs of long duration are preventable simply by the reduction of the visible solid impurities cast into the air by the process of combustion."

***Russell,** Rollo.

Smoke and fog. 1912. (In Papers read at the Smoke Abatement Conferences, March . . . 1912, p. 21-22.)

Considers meteorological conditions that cause dense fogs, when aided by presence of coal smoke.

***Russell,** W. J.

On town fogs and their effects. 1891. (In Transactions of the Seventh International Congress of Hygiene and Demography, v. 5, p. 11-21.)

Conditions of fog formation, considering prevalence and harmful effects of fogs.

***Shaw,** W. N.

Is London fog inevitable? 2,200 w. 1906. (In Journal of the Royal Sanitary Institute, v. 27, p. 49.)

**The same.* 1906. (In Addresses, papers and discussions at the Conference on Smoke Abatement, p. 8-12.)

Logical conclusion seems to be that "from such evidence as we possess . . . the abolition of coal smoke would cut off twenty per cent. of fogs altogether, that it would add most materially to the power of the sun to dissipate fogs and thus indirectly reduce their duration."

***Smith,** J. Warren.

Climate of the city and country compared. 1902. (In United States—Weather Bureau. Monthly weather review, v. 40, p. 30-31.)

Smoke is considered partly the cause of the condition that in country districts, in winter especially, temperature is always lower on clear, still nights than in nearby cities.

***Smith,** Robert Angus.

Coal smoke. 1872. (In his "Air and rain," p. 452-468.)

"From 'Report under the Alkali Act,' for 1868."

***Smith,** Robert Angus.

On the air of towns. 1859. (In Journal of the Chemical Society, v. 11, p. 196-235.)

Deals in general with injurious effects of smoke.

***Smoke** and dust. 1902. (In Engineering magazine, v. 24, p. 280-281.)

Discusses papers, at Manchester congress of the Sanitary Institute, by W. N. Shaw and James Crichton-Browne.

***Thomson,** William.

Some common sources of air pollution. 9 dr. 127-142 p. 1888. (Manchester and Salford Noxious Vapours Abatement Association. Lectures on air pollution, No. 10.)

Chief attention is to coal smoke.

***Tyndall,** John.

On dust and disease. 1895. (In his "Essays on the floating-matter of the air," p. 1-43.)

Includes account of experiments in which dust-free spaces are investigated.

***Tyndall,** John.
On dust and smoke. 1871. (In Chemical news, v. 24, p. 25-28.)
Lecture at the Royal Institution, London.
Mainly devoted to considerations of dust as a promoter of disease and of the germ theory of disease. Advocates use of special respirator in the presence of dense smoke.

***Tyndall,** John.
Ueber den atmosphärischen staub. 1,000 w. 1870. (In Dingler's polytechnisches journal, v. 198, p. 72-74.)

***Winterliche** sonnenschein in London und seine beeinflussung durch rauch und russ. 500 w. 1911. (In Rauch und staub, v. 1, p. 310.)
Based on official "Daily weather reports" of London.

Effect on structural and decorative materials

See also Railroads, including effect on tunnels.

***Architecture** and the smoke nuisance. 1907. (In Architectural record, v. 22, p. 418-419.)
Editorial comment on pamphlet issued by Cleveland Chamber of Commerce.

***Beeinflussung** der isolation elektrischer fernleitungen durch den rauch von dampflokomotiven. 150 w. 1910. (In Rauch und staub, v. 1, p. 91.)
Abstract from "Schweizerische bauzeitung," 9 July, 1910, p. 24.

***Benner,** Raymond C.
How and why smoke is injurious. 3 ill. 1912. (In Metallurgical and chemical engineering, v. 10, p. 735-737.)
Discusses constituents of smoke, and injurious action in general, with chief attention to effect on vegetation and on building materials. Deals in part with observations in Pittsburgh.

***Benner,** Raymond C.
Smoke perplexities of the architect. 2,000 w. 1913. (In American architect, v. 103, p. 192-197.)

***Benner,** Raymond C.
Smoke the destroyer. 5 ill. 1912. (In Scientific American, v. 107, p. 181, 186.)
Discusses effect of smoke and soot on buildings, considering best smoke-resisting materials. Acid nature of soot is shown to be destructive in action on various materials.

***Beziehungen** zwischen steinkohlenrauch und korrosion der metalle. 1911. (In Rauch und staub, v. 1, p. 279-281.)

***Caroe,** W. D.
Smoke and stone work. Caen stone at Canterbury suffers from acid-laden fumes. 450 w. 1907. (In Stone, v. 28, p. 140.)
Abstract of letter to London "Times."

***Chubb,** Lawrence W.
Smoke abatement. 16 p. 1912.

**The same, abstract.* 1912. (In Architect and contract reporter, v. 87, p. 87-88, 101-103.)
Paper before Institute of Sanitary Engineers, 22 Jan., 1912.
Considers harmful action of smoke on health, and on public buildings. Shows economy of smoke suppression.

***Church, Arthur.**
Notes on the action of coal smoke on building stones and mural paintings. 1912. (In Papers read at the Smoke Abatement Conferences, March . . . 1912, p. 1-4.)

**The same.* (In Architect and contract reporter, v. 87, p. 213-214.)
Sulphuric acid is shown to be the active harmful agent.

***Corrosion** of iron and steel roofing. 1913. (In Metal worker, v. 79, p. 157.)
Refers to investigations at University of Pittsburgh on corrosive effects of soot and smoke.

***Experiments** on the weathering of limestone. 1913. (In Engineering record, v. 67, p. 164-165.)
Investigation conducted by Dr. J. S. Owens on action of smoke and natural agents on limestone.

***Heaton,** Noel.
Influence of smoke on decorations. 1912. (In Papers read at the Smoke Abatement Conferences, March . . . 1912, p. 5-8.)

**The same.* (In Architect and contract reporter, v. 87, p. 209-210.)
Considers influence of smoke on paint coatings, and on interior oil and fresco paintings.

***Holden,** John.
Pollution of air as affecting the architect and his work. 87-96 p. 1888. (Manchester and Salford Noxious Vapours Abatement Association. Lectures on air pollution, No. 7.)
Touches on esthetic phases of smoke nuisance, and on deleterious effects of smoke and gases on structural materials.

***Longmuir,** Percy.
Corrosion of metals. 1911. (In Journal of the Iron and Steel Institute, v. 83, p. 147-164.)
Discussion, p. 165-166; correspondence, p. 166-169.
Deals to considerable extent with atmospheric corrosion, considering effect of soot and gases. Chief attention to corrosion of iron and steel.

***Monasch,** Berthold.
Beziehungen der beleuchtungstechnik zur rauch- und staubfrage. 1911. (In Rauch und staub, v. 1, p. 290-292.)
Effects of smoke and dust on illumination and on illuminating apparatus. Favors incandescent electric lights.

***O'Connor,** John, *jr.*
The city beautiful and smoke. 4 ill. 1912. (In Pittsburgh bulletin, v. 65, Nov. 2, p. 9.)
Effect of smoke on public buildings and artistic works.

***Pudor,** Heinrich.
Wie sehen unsere bauten aus? 1910. (In Tonindustrie zeitung, v. 34, pt. 2, p. 1209-1210.)

**The same, abstract.* 300 w. 1910. (In Rauch und staub, v. 1, p. 58.)
Brief discussion of injury to buildings and structural materials by smoke and soot.

***Redfern,** Harry.
Effect of coal smoke on buildings. 1912. (In Papers read at the Smoke Abatement Conferences, March . . . 1912, p. 9-14.)

**The same.* (In Architect and contract reporter, v. 87, p. 204-206.)
Limits itself to the effect of smoke on the appearance of architectural stonework. Gives recommendations for solutions for washing and coating of affected stonework.

***Richmond,** William B.

Administration, legislation and necessary reforms. 1,500 w. 1906. (In Journal of the Royal Sanitary Institute, v. 27, p. 211.)

Discussion. 1,200 w. p. 243.

**The same.* 1906. (In Addresses, papers and discussions at the Conference on Smoke Abatement, p. 113-116.)

Considers destructive influence of acid constituents. Little attention to subject indicated by title, further than a general plea for more rigid laws.

***Richmond,** William B.

Smoke abatement. 1909. (In Journal of the Royal Institute of British Architects, v. 58, ser. 3, v. 16, p. 485-488.)

Discussion, p. 488-492.
Deals mainly with esthetic side, recommending more stringent laws and rigid enforcement.

***Rideal,** S.

Effects of town air on metal work. 1912. (In Papers read at the Smoke Abatement Conferences, March . . . 1912, p. 15-20.)

Considers especially the corrosive effects of sulphuric acid and other acid constituents of smoke and town air.

***Smoke** and stonework. 1907. (In Stone, v. 31, p. 229-230.)

Editorial, discussing methods for treating stonework to prevent disfiguring effect of smoke and soot.

***Voelcker,** Augustus.

On the injurious effects of smoke on certain building stones and on vegetation. 1864. (In Journal of the Society of Arts, v. 12, p. 146-151.)

Discussion, p. 151-153.
Studies from personal observations injurious influence of different gaseous constituents of smoky atmospheres on limestones and calcareous sandstones. Briefly considers damage from smoke to staple crops and trees.

***Wallace,** William.

On the decay of building stones. 1883. (In Chemical news, v. 47, p. 228-231.)

Discusses briefly the effect of acids in the air, especially in towns where coal is burned. Recommends preservative coatings for stone."

***White,** Alfred H.

Disintegration of fresh cement floor surfaces by the action of smoke gases at low temperatures. 1909. (In Proceedings of the American Society for Testing Materials, v. 9, p. 530-533.)

**The same.* (In Concrete, v. 9, July, p. 38-40.)

Conclusion.—"Smoke gases, on account of their carbon dioxide, exert a very harmful effect on hydraulic cement setting at a temperature below 42° F., an unstable hydrated calcium carbonate being formed which at only slightly higher temperatures effloresces with complete loss of its bonding properties. This action is a superficial one and would probably not weaken structural concrete appreciably, but merely cause dusting of the surface. The effect is most notable on floors. It is probably never advisable to lay the top coat of floors in rooms which are being heated by open fires, but if this is unavoidable, the temperature should be kept safely above 45° F. A higher temperature will act advantageously in preventing an excessively slow initial set of the cement."

***Witz,** G.

Sur la presence de l'acide sulfureux dans l'atmosphère des villes. 1885. (In Comptes rendus hebdomadaires des séances de l'Académie des Sciences, v. 100, p. 1385-1388.)

Sulphurous acid is indicated in air of towns by fact that placards colored with red lead are gradually decolorized.

Effect on vegetation

***Agar, M.**
Effect of smoke on plant life. 1,000 w. 1906. (In Journal of the Royal Sanitary Institute, v. 27, p. 173-175.)

******The same.*** 1906. (In Addresses, papers and discussions at the Conference on Smoke Abatement, p. 101-103.)

Shows soot to be chief enemy of vegetation in London.

***Agar, M.**
Effect of smoke on vegetation. 1912. (In Papers read at the Smoke Abatement Conferences, March . . . 1912, p. 30-32.)

Considers damage to plant life from acid constituents of smoke and from solid deposits. Briefly considers best type of tree for smoke-laden air.

***Bean,** J. W.
Note on recent observations of the smoke nuisance at Kew Gardens. 1912. (In Papers read at the Smoke Abatement Conferences, March . . . 1912, p. 29.)

Direct testimony on the harmful effects of smoke on plant life. Perceptible improvement, however, is noted in London atmosphere.

***Bericht** des königlich sächsischen Finanzministeriums vom 29 Dezember, 1910, über das ergebnis des preisausschriebens vom 7 August, 1908, betreffend verhütung von rauchschäden in der land- und forstwirtschaft. 450 w. 1911. (In Rauch und staub, v. 1, p. 141.)

Brief outline of report.

***Blakeslee,** Albert Francis, & **Jarvis,** Chester Deacon.
Common injuries to shade trees. Injuries caused by gas and smoke. 1913. (In their "Trees in winter," p. 124-125.)

"The only remedies for this trouble are the passing of city ordinances that aim to regulate the smoke nuisance, and the avoiding of species like the elm, the sugar maple, and others that are especially susceptible to gas poisoning." Page 125.

Boehm, Jos.
Uber den einfluss der kohlensaure auf das ergrünen und wachsthum der pflanzen. 1873. (In Sitzungsberichte der kaiserlichen Akademie der Wissenschaften. Mathematisch-naturwissenschaftliche classe, v. 68, heft 1 und 2, June-July, 1873, p. 171-184.)

Bömer, M., **Haselhoff,** E. & **König,** J.
Ueber die schädlichkeit von sodastaub u. ammoniakgas auf die vegetation. 1892. (In Landwirtschaftliche jahrbücher, v. 21, p. 407-425.)

Borggreve, B.
Entgegnung an Herrn. Prof. Dr. Ramann. 1896. (In Zeitschrift für forst- und jagdwesen, v. 28, p. 679-680.)

Relating to Ramann's discussion with Hartig.

Borggreve, Bernard.
Über waldschäden in der umgebung industrieller anlagen. 1877. (In Forstliche blätter; zeitschrift für forst- und jagdwesen, n. s. v. 6, p. 49-54.)

***Buckhout,** W. A.

The effect of smoke and gas upon vegetation. 29 p. Ill. 1900. (In Sixth annual report of the Pennsylvania Department of Agriculture, pt. 1, p. 164.)

**The same*. 4,800 w. (In Mines and minerals, v. 23, p. 443.)

Injurious substances and the difficulty of their detection.

[**Cameron,** C. A.]

Influence of chemical exhalations on agriculture. 1874. (In Garden chronicle, a weekly illustrated journal of horticulture and allied subjects, 1874, pt. 1, n. s. v. 1, p. 274-275.)

Abstract of lecture before Lancashire Chamber of Agriculture. From the "Liverpool mercury," 20 Feb., [1874?]

Describes cases of utter destruction of vegetation and crops, and advocates extension of Alkali Nuisance Prevention Act to apply to all industries.

***Cramer,** E.

Sind ringofengase schädlich für die umliegende vegetation? 1899. (In Chemiker-zeitung, v. 23, pt. 1, p. 211-213, 320.)

Lecture before Deutschen Verein für Fabrikation von Ziegeln, Thonwaaren, Kalk und Cement.

Discusses injurious effects of industrial waste gases including smoke from steam-boiler plants.

See also criticism by Woydt, p. 329.

*Crowther, C. & **Ruston,** A. G.

Nature, distribution and effects upon vegetation of atmospheric impurities in and near an industrial town. 300 w. 1911. (In United States—Department of Agriculture. Experiment station record, v. 25, p. 434.)

Abstract from "Journal of agricultural science."

Impurities in atmosphere near Leeds, England, were studied through rain water investigations. The free acid present in atmosphere was found detrimental to plant growth for many reasons.

Danger, L.

Über die einwirkung des rauchs auf die vegetation. 1887. (In Just's botanischer jahrsbericht, v. 15, pt. 2, p. 339.)

Abstract from "Hannover'sche land- und forstwirtsch. Z.," 1887, no. 22.

Detmer, Wilhelm.

Ueber die einwirkung verschiedener gase, insbesondere des stickstoffoxydulgases auf pflanzenzellen. 1882. (In Landwirtschaftliche jahrbücher, v. 11, p. 213-232.)

Bibliographic foot-notes.

Results of numerous tests.

***Ebaugh,** W. Clarence.

Gases vs. solids: an investigation of the injurious ingredients of smelter smoke. 1 diag. 1 ill. 1907. (In Journal of the American Chemical Society, v. 29, pt. 2, p. 951-970.)

Concludes "that heretofore undue emphasis has been laid upon the injurious effects of sulphur dioxide upon growing plants and that the harmful action of the solid emanations from the smelters—the so-called 'flue dust'—has been seriously underestimated."

Ebermayer, E.

Über den nachteiligen einfluss von cellulose-fabriken auf die vegetation, und speciell auf die obstbaume. 1877. (In Landwirtschaftlichen versuchs-stationen, v. 20, p. 392-393.)

Considers briefly effects of various deleterious substances in industrial gases.

***Ficke.**

Ueber rauchschäden im rheinisch-westfälischen industriegebiet. 1913. (In Rauch und staub, v. 3, p. 162-167.)

Deals mainly with injuries to vegetation. Foot-note references.

***F.**

Verunreinigung der atmosphäre durch fabriken und gewerbe. 1876. (In Dingler's polytechnisches journal, v. 220, ser. 5, v. 20, p. 87-89.)

Effects on vegetation. Discusses coal smoke and smelter fumes, considering both injurious.

Fassbender, G. & Grevillius, A. Y.

Über die einwirkung von essigsäuredampfen und verdünnten essigsaurelosungen auf pflanzen. 1899. (In Landwirtschaftlichen versuchs-stationen, v. 52, p. 195-208.)

Records many tests on various plants, dealing mainly with effect on parts above ground.

Frank, A. B.

Die krankheiten der pflanzen, ein handbuch für land- und forstwirte, gartner, gartenfreunde und botaniker. ed. 2, 3 v. 1895.

"Erkrankungen durch atmosphärische einflusse," v. 1, p. 154-245; "Erkrankungen durch einwerkung schädlicher stoffe," v. 1, p. 305-328. Frequent foot-note references.

***Frazer, Persifor.**

Search for causes of injury to vegetation in an urban villa near a large industrial establishment. 1907. (In Transactions of the American Institute of Mining Engineers, v. 38, p. 498-555.)

"Bibliography of injuries to vegetation by furnace-gases," p. 520-555. Studies effect of smoke and flue gases on vegetation. Author has followed the old-established method of analyzing the plant and soil of the region investigated, and, for comparison, those of a region remote from the injurious action; but in addition, he has measured, by specially devised apparatus, the amount of sulphur oxids in the air from the works, and compared it with that coming from other directions. This latter method "seems never heretofore to have been employed, except by Prof. Mabery in 1894." Bibliography contains 48 references, with abstracts.

Fricke, E.

Beschädigung von garten- und feldgewächsen durch hüttenrauch. 1887. (In Landwirtschaftlichen versuchs-stationen, v. 34, p. 277-283.)

Comparative examination of healthy vegetation of many kinds, and of similar specimens injured by smoke and smelter fumes.

Gerlach.

Besondere vorkommnisse und beobachtungen bei waldbeschädigungen durch rauchgase. 1908. (In Jahresbericht der Vereinigung für Angewandte Botanik, v. 6, p. 76-79.)

Abstract from "Zeitschrift für forst- und jagdwesen," v. 40, p. 429-437. Considers condition of air at various distances from source of smoke, and gives analyses of injured pine needles.

Gerlach.

Einige charakteristische merkmale und beweismittel für das vorhandensein von rauchschäden in fichtenbeständen auf grund eigener beobachtungen und erfahrungen. 1908. (In Jahresbericht der Vereinigung für Angewandte Botanik, v. 6, p. 75-76.)

Abstract from "Allgemeine forst- und jagd-zeitung," Nov., 1907.

***Gerlach, C.**

Beiträge zur ermittelung des holzmassenverlustes infolge von rauchschäden. 81 p. 7 diag. 1910. (Sammlung von abhandlungen über abgase und rauchschäden, no. 5.)

***Grohmann,** Th.
Erfahrungen und anschauungen über rauchschäden im walde und deren bekämpfung. 44 p. 23 ill. 1910. (Sammlung von abhandlungen über abgase und rauchschäden, no. 6.)

***Hagen.**
Flurbeschädigung durch rauchgase. 1895. (In Zeitschrift für angewandte chemie, v. 8, p. 279-280.)
General consideration of injury to vegetation from various constituents of smoke and fumes.

***Hagen,** Max.
Zur beeinträchtigung der landwirtschaft durch rauch von fabrikschornsteinen. 1896. (In Chemiker-zeitung, v. 20, pt. 1, p. 238-239, 267-268, 283-284.)
Conclusions are that soluble chlorin and sulphur acids are very harmful in their physiological effects on plant life, but that solid dust from ashes and cinders causes little trouble.

Hartig, Robert, i. e. Heinrich Julius Augustus Robert.
Berichtigung, die untersuchung von rauchbeschädigungen betreffend. 1896. (In Zeitschrift für forst- und jagdwesen, v. 28, p. 680-687.)
Largely criticism of Ramann's article "Ueber rauchbeschädigung."
See also comment by Ramann, p. 687-688.

Hartig, Robert, i. e. Heinrich Julius Augustus Robert.
Ueber die einwirkung des hutten- und steinkohlenrauches auf die gesundheit der nadelwaldbäume. 48 p. colored pl. 1896.
Reprint from "Forstlich naturwissenschaftlichen zeitschrift," 1896.

Haselhoff, Emil.
Versuche über die einwirkung von flugstaub auf boden und pflanzen. 1908. (In Jahresbericht der Vereinigung für Angewandte Botanik, v. 6, p. 92-93.)
Abstract from "Landwirtschaftlichen versuchs-stationen," 1907, p. 156-205.
Results of boiler firing with coal and lignite.

***Haselhoff,** Emil, & **Lindau,** G.
Die beschädigung der vegetation durch rauch; handbuch zur erkennung und beurteilung von rauchschäden. 412 p. 27 ill. 1903.
"Zusammenstellung der wichtigsten arbeiten über rauchbeschädigungen," p. 395-400.
Extensive investigation of the injurious effects of smoke and noxious gases on plant life.

*[**Hasenbäumer,** J.]
Pflanzenbeschädigung durch industriestaub. 1912. (In Rauch und staub, v. 3, p. 59-60.)
Based on author's paper "Der nachweis von pflanzenbeschädigungen durch rauchgase und staub," in "Festschrift der Medizinisch-Naturwissenschaftlichen Gesellschaft in Münster," 1912.
Deals with smoke as well as dust.

***Hasenclever,** Robert.
Ueber beschädigung der vegetation durch saure gase. 1895. (In Chemische industrie, v. 18, p. 496-499.)

***Hasenclever,** Robert.
Ueber die beschädigung der vegetation durch saure gase. 6 ill. 1879. (In Chemische industrie, v. 2, p. 225-231, 275-280.)

***Haywood,** J. K.
Injury to vegetation and animal life by smelter fumes. 1907. (In Journal of the American Chemical Society, v. 29, pt. 2, p. 998-1009.)

Contribution from the Miscellaneous Laboratory, Bureau of Chemistry. Considers resistance of different kinds of trees to the effects of smelter fumes. Concludes that at Anaconda vegetation is harmed seriously "for at least 7 to 8 miles south and 13 to 15 miles west," that arsenic is present in the forage crops in sufficent quantities to poison cattle and that the waste from the reduction plant renders the river unfit for use for irrigation purposes.

***Haywood,** J. K.
Injury to vegetation by smelter fumes. 9 ill. 1905. (United States—Bureau of Chemistry. Bulletin 89.)

Extensive observation and experimental work. Concludes that sulphur dioxid when present in the air in very small quantities kills vegetation, and that such injury shows itself by the increased sulphur trioxid content of the foliage.

***Haywood,** J. K.
Smelter smoke. 1907. (In Science, v. 49, p. 476-478.)

Takes exception to conclusions drawn by Ebaugh in article in Journal of the American Chemical Society (v. 29, p. 951.) Believes injury to vegetation to be due to the effect of sulphur dioxid.

Hess.
Ueber die einwirkung des steinkohlenrauchs auf das wachsthum der waldbäume. 1874. (In Forstliche blätter; zeitschrift für forst- und jagdwesen, n. s. v. 3, p. 31.)

Mentions work of Stöckhardt and Schroeder, and gives author's personal observations, mainly on elm trees.

***Holland,** Robert.
Air pollution as affecting plant life. 2 ill. 111-125 p. 1888. (Manchester and Salford Noxious Vapours Abatement Association. Lectures on air pollution, No. 9.)

Injurious effects of smoke and gas laden atmosphere on various forms of vegetation. Considers smoke abatement feasible.

Author is (1888) consulting botanist to the Royal Manchester, Liverpool and North Lancashire Agricultural Society.

***Hüppner,** O.
Sind ringofengase schädlich für die umliegende vegetation? 1900. (In Chemiker-zeitung, v. 24, pt. 1, p. 36.)

Brief discussion of papers by Cramer, (1899) and Winkler, (1896). Concerned largely with water content of fumes and gases. Mentions coal smoke briefly. Suggests dilution of furnace gases to diminish injurious effects.

***Husson,** C.
Action de la fumée des fours à chaux sur les vignes. 1876. (In Comptes rendus hebdomadaires des séances de l'Académie des Sciences, v. 82, p. 1218-1221.)

Investigates effect on odor and taste of wines from vines exposed to smoke from lime kilns.

Just, L.
Beschwerde der rebenbesitzer in Ettlingen über die schädlichen wirkungen des fabrikrauches (p. 32); Vegetationsschäden, verursacht durch rauch der kreosothütte bei Konstanz (p. 40). 1885. (In I Bericht über die thätigkeit der Grossh. badischen pflanzenphysiologischen Versuchsanstalt zu Karlsruhe im jahre 1884, p. 32; 40.)

Just, L. & Heine, H.

Zur beurteilung von vegetationsschäden durch saure gase. 1889. (In Landwirtschaftlichen versuchs-stationen, v. 36, p. 135-158.)

Considers work of other investigators including Freytag, Stöckhardt, Mach, Nobbe, Schroeder and Reuss.

Klemm, Paul.

Desorganisationserscheinungen der zelle. Ill. 1895. (In Jahrbücher für wissenschaftliche botanik, v. 28, p. 627-700.)

Discusses effect on plant cells, of changes in temperature, light, electricity, alkalies, acids and various other substances. Foot-notes. "Literatur," p. 698-699.

Kny, L.

Einfluss des leuchtgases auf die baumvegetation. 1871. (In Sitzungsberichte der Gesellschaft Naturforschender Freunde zu Berlin, 20 June, 1871, p. 51-55.)

The same. 5 p. 1872. (In Botanische zeitung, v. 29, column 852, 868.)

Results of year's observation and experimentation in botanical garden to prove deleterious effect. Report and subsequent discussion agree as to harmful effects.

König, J. & **Haselhoff,** E.

Schädlichkeit der stickstoffsäuren für pflanzen. 1894. (In Landwirtschaftliche jahrbücher, v. 23, p. 1031-1034.)

Tests on different kinds of trees for varying periods.

König, J., **Steffeck,** & **Heine,** H.

Schutz gegen flurbeschädigungen durch gewerbliche einwirkungen. 44 p. 1896. (In Arbeiten der deutschen Landwirtschafts-Gesellschaft, Heft 14.)

No. 14 consists of three separate papers with preface by F. V. Sybel. König's paper deals at length with effects of ashes, dust and gases of various kinds on different forms of plant life.

Lackner, Carl.

Gartnerische plaudereien. 1873. (In Monatsschrift des Vereines zür Beförderung des Gartenbaues in den königl. preuss. Staaten für Gartnerei und Pflanzenkunde, v. 16, p. 16-22.)

Unimportant. Mentions effect of the constituents of illuminating gas on camellia and other plants.

Lindau, Gustav.

Über erkennung und verhütung der beschädigung der vegetation durch rauch. 1903. (In Gesundheits-ingenieur, v. 26, p. 79-81.)

More fully treated in Haselhoff and Lindau's "Beschädigung der vegetation durch rauch."

***Löckermann.**

Bedeutung der rauchschäden für den obst- und gartenbau. 600 w. 1911. (In Rauch und staub, v. 1, p. 335.)

Abstract from "Deutsche obstbauzeitung," 1911, pt. 4, p. 67-69.

***Lüty,** Fr.

Die beschädigung der vegetation durch hüttenrauch. 600 w. 1891. (In Zeitschrift für angewandte chemie, v. 4, p. 163-164.)

Considers harmful constituents under heads of waste products from metallurgical works, and acid gases.

Mach, E.
Über die schwefelsäure-gehalt von schwefliger säure beschädigter gewächse. 1888. (In Landwirtschaftlichen versuchs-stationen, v. 35, p. 53-54.)

Analyses of grass and hay.

***McIntosh,** John Houston.
Million for a smoke eater. 11 ill. 1910. (In Technical world magazine, v. 13, p. 156-165.)

Considers damage done to plant and animal life by fumes from copper smelters in Montana. Reviews injunction suit of Farmers' Association of the Deer Lodge Valley against Anaconda Copper Mining Company.

Morren, Édouard, i. e. Charles Jacques Édouard.
Recherches expérimentales pour déterminer l'influence de certains gaz industriels, specialement du gaz acide sulfureux sur la vegetation. 26 p. 2 pl. 1866.

Extract from "Report of the International Horticultural Exhibition and Botanical Congress," London, 1866, p. 223-248.

Considers effects of the products of distillation, and of combustion of various kinds of coal.

***Müller,** H. C.
Injury through smoke and flue dust. 200 w. 1912. (In United States—Department of Agriculture. Experiment station record, v. 26, p. 38.)

Abstract from "Ber. Agr. Chem. Kontroll u. Vers. Stat. Pflanzenkrank. Prov. Sachsen," 1910.

Brief notes on effect of coal smoke, chlorin, sulphur and other fume constituents on crops and trees.

Oliver, F. W.
On the effects of urban fogs upon cultivated plants. Preliminary report. 1891. (In Journal of the Royal Horticultural Society, v 13, p. 139-151.)

Oliver, F. W.
On the effects of urban fogs upon cultivated plants. Second report. 1893. (In Journal of the Royal Horticultural Society, v. 16, p. 1-59.)

Valuable paper, extending work of his Preliminary report. Author's investigations include much microscopic and physiologic work. Specially concerned with "fog, contaminated with the products of coal combustion," comparing effects with those of "pure country mists, uncontaminated by smoke."

***Ost,** H.
Untersuchung von rauschschäden. 1 diag. 1896. (In Chemiker-zeitung, v. 20, pt. 1, p. 165-171.)

Investigates the harmful influence of sulphur dioxid, chlorin, fluorin compounds and other fume constituents on vegetation. Gives analyses showing content of these gases in leaves exposed to their action.

Ost, H. & **Wehmer,** C.
Zur beurtheilung von rauchschäden. 1 map. 1 colored pl. with 9 fig. 1899. (In Chemische industrie, v. 22, p. 233-237.)

Shows clearly the injuries to vegetation, but does not indicate nature of smoke or gases responsible for the effects produced. Mainly effect on rose bushes.

Pappenheim.
Bericht . . . über die zinkhütten in Borbeck und Eppinghoven. 1865. (In Verhandlungen des Vereins zur Beförderung des Gewerbfleisses in Preussen, v. 44, p. 65.)

Devoted chiefly to effects on vegetation.

***Pfeiffer**, Otto.
Vegetationsschäden durch gasausströmungen. 1898. (In Journal für gasbeleuchtung, v. 41, p. 137-139.)

Investigates injury to vegetation from illuminating gas escaping from underground pipes.

***Pflanzenbeschädigung** durch industriegase. 1912. (In Rauch und staub, v. 3, p. 109-112.)

Refers to Hasenbaumer's work. Deals mainly with results of determining sulphuric acid content of injured plants.

Pfützner.
[Schadliche einwirkung des steinkohlen- und hüttenrauches auf die holzvegetation.] 1882. (In Jahrbuch des schlesischen Forstvereins für 1881, p. 33-38.)

Discusses work of other investigators, giving references, and reports personal observations.

Portele, Karl.
Über die beschädigung von fichtenwaldbestanden durch schweflige saure. 1 fig. 1891. (In Österreichisches landwirtschaftliches centralblatt, v. 1, p. 27-38.)

The same, abstract. 70 w. 1891. (In Just's botanischer jahresbericht, v. 19, p. 228.)

Prevost, E. W.
Beiträge zur kenntnis der beschädigung der pflanzen und bäume durch hüttenrauch. 1888. (In Landwirtschaftlichen versuchsstationen, v. 35, p. 25-28.)

***Ramann.**
Bericht über die untersuchungen der ringofengase bezüglich ihrer schädlichkeit für die vegetation. 1901. (In Thonindustrie-zeitung, v. 25 pt. 1, p. 923-930.)

Studies effect of gases from brick works on vegetation, and finds them much less harmful than claimed. Winkler's theory is considered inconclusive.

Ramann, E.
Bemerkungen zu den vorstehenden artikeln [Hartig's "Berichtigung, die untersuchung von rauchbeschädigungen betreffend"]. 1896. (In Zeitschrift für forst- und jagdwesen, v. 28, p. 687-688.)

Ramann, E.
Über rauchbeschädigungen. 1896. (In Zeitschrift für forst- und jagdwesen, v. 28, p. 551-556.)

Discussion by Borggreve and Hartig, p. 679-687.
Effect of light and shade on vegetation, and conditions at various distances from industrial works.

***Reuss.**
Hüttenrauchschäden in den waldungen des Oberharzes. 1881. (In Dingler's polytechnisches journal, v. 241, ser. 5, v. 41, p. 124-132, 204-212, 285-291.)

Investigation of effects on various kinds of forest trees.

Reuss, Carl.
Rauchbeschädigung in dem gräflich v. Tiele-Winckler'schen forstreviere Myslowitz-Kattowitz. Nachtrag zu dem werke gleicher bezeichnung v. jahre 1893. und entgegnung auf die schrift. "Waldschäden im oberschlesischen industriebezirk pp. eine rechtfertigung der industrie gegen folgenschwere falsche anschuldigungen von Professor Dr. B. Borggreve." 61 p. 1 map. 1896.

Reuss, Carl.
Rauchbeschädigung in dem von Tiele-Winckler'sche forstreviere Myslowitz-Kattowitz, insbesondere ermittlung, bewerthung und vertheilung des rauchschadens. 236 p. 1893.

Reuss, Karl.
Massnahmen gegen die ausbreitung von hüttenrauchschäden im walde. 1908. (In Jahresbericht der Vereinigung für Angewandte Botanik, v. 6, p. 73-74.)

Abstract of paper, "Section 8 des Internationalen Landwirtschaftlichen Kongresses zu Wien," 1907.

Rhode, A.
Schädigung von roggenfelder durch die einer superphosphatfabrik entströmenden gase. 1895. (In Zeitschrift für pflanzenkrankheiten, v. 5, p. 135-136.)

***Rigg,** Arthur.
On the destructive effect of smoke in relation to plant life. 1,000 w. 1906. (In Journal of the Royal Sanitary Institute, v. 27, p. 160.)

**The same.* 1906. (In Addresses, papers and discussions at the Conference on Smoke Abatement, p. 88-90.)

Relates to plant life of London, stating that "it may be taken as a general rule that a London garden costs twice as much as a country garden of the same size, and this is entirely due to fogs and their constant companion, smoke."

Rösler.
Ein beitrag zu den beobachtungen über die schädlichen einflusse des hüttenrauches auf pflanzen und thiere. 1865. (In Mittheilungen des Landwirtschaftlichen Instituts der Universität Halle, 1865, p. 179-190.)

***Rusnov,** Peter von.
Effects of factory smoke on pine forests. 100 w. 1910. (In United States—Department of Agriculture. Experiment station record, v. 23, p. 726.)

Abstract from "Centbl. Gesam. Forstw.," 1910.
Notes injuries from smoke in separate regions, in which trees were killed over large areas by the sulphur fumes.

Rusnov, Peter von.
Über die feststellung von rauchschäden im nadelwald. 13 p. 1910. W. Frick.

***Rusten,** Arthur G.
Air pollution by coal smoke and its effects on vegetation. 1912. In Papers read at the Smoke Abatement Conferences, March . . . 1912, p. 33-45.)

**The same, abstract.* (In Journal of the Royal Sanitary Institute, v. 33, p. 433-435.)

Investigates amount and nature of deposited impurities, effect of diminished sunlight, and effect on different kinds of trees.

***Ruston,** Arthur G.
Effects of smoke on vegetation. 1 dr. 5 ill. 1911. (In Proceedings of the Conference of the Smoke Abatement League of Great Britain, Manchester, 21-22 Nov., 1911, p. 44-53.)

**The same, translated.* 1912. (In Rauch und staub, v. 2, p. 93-98.)

Shows prejudicial effect of smoke and smoke acids, and claims that this effect can be definitely measured. Chief injurious factors are (1.)

***Ruston,** Arthur G.—*continued.*

Smoke cloud limiting available sunlight. (2.) Tarry matter of soot coating leaves and choking stomata. (3.) Presence of free acids in air tending to lower vitality of plant. (4.) Effect of free acids falling on soil and limiting activity of soil organisms, principally nitrifying organisms.

***Ruston,** Arthur G. & **Crowther,** Charles.

Impurities in the air of towns, and their effects upon vegetation. 1910. (In Report of the British Association for the Advancement of Science, v. 80, p. 577-578.)

Published in abstract.

Deals mainly with conditions in region of Leeds, considering high amounts of suspended matter in town air, and relatively high acidity of town rains.

Schmitz-Dumont, W.

Versuch über die einwirkung von fluorwasserstoff in der atmosphäre auf pflanzen. 1896. (In Tharander forstliches jahrbuch, v. 46, p. 50-57.)

Tests showing injurious effects, considering also sulphurous acid found in smoky air. Very small amounts exert harmful influence when long continued.

Schroeder, Julius von.

Einwirkung der schwefligen säure auf die pflanzen. Ill. 1872-73. (In Tharander forstliches jahrbuch, v. 22, p. 185-239; v. 23, p. 217-267.)

The same. Ill. 1872-73. (In Landwirtschaftlichen versuchs-stationen, v. 15, p. 321-355; v. 16, p. 447-470.)

**The same, abstract.* 1873. (In Dingler's polytechnisches journal, v. 207, p. 87-88.)

The same, abstract. 1872. (In Central-blatt für agriculturchemie und rationellen wirtschafts-betrieb, v. 2, p. 302-304.)

Exhaustive study, including examination of various individual types of vegetation. Considers sulphurous acid in its rôle as the most injurious constituent of coal smoke and smelter gas. One of the conclusions reached is that injurious effects are enhanced by light, and therefore coal smoke and smelter fumes damage vegetation less at night than during the day.

Schroeder, Julius von.

Ueber die beschädigung der vegetation durch rauch; eine beleuchtung der Borggreve'schen theorien und anschauungen über rauchschaden. 35 p. 1895. Freiberg in Sachsen.

***Schroeder,** Julius von, & **Reuss,** Carl.

Beschädigung der vegetation durch rauch und die Oberharzer hüttenrauchschäden. 333 p. 5 pl. (4 colored.) 1883.

**The same, abstract.* (In Chemische industrie, v. 6, p. 179-180.)

**The same, abstract translation.* (In Moniteur scientifique, v. 26, p. 32-34.)

Exhaustive study. One chapter devoted to deleterious effects of coal smoke.

Schroeder, Julius von, & **Schertel,** A.

Rauchschäden in den wäldern der umgebung der fiskalischen hüttenwerke bei Freiberg. 1 folding pl. 1884. (In Jahrbuch für das berg- und hüttenwesen im Königreiche Sachsen auf das jahr 1884, pt. 2, abhandlungen, p. 93-120.)

Nineteen pages of tables giving much detailed information. Map indicates effect of smelter fumes and of locomotive smoke on vegetation of the regions.

***Schroeder,** [Julius] von, & **Schmitz-Dumont,** W.
Neue beiträge zur rauchfrage. 1896. (In Dingler's polytechnisches journal, v. 300, p. 65-71, 111-118, 136-139.)

The same. 1896. (In Tharander forstliches jahrbuch, v. 46, p. 1-50.)

Concerned almost wholly with the deleterious action of smoke on trees, giving experiments with coniferous and with deciduous varieties. The effect of sulphurous acid of infinitesimal concentrations is investigated. Its harmful action is found to be through direct contact with leaf and needle and not through absorption by the root from an acid soil. The power of subsequent rain to relieve the plant life by washing away traces of acid is also considered.

***Schröter,** E.
Die rauchquellen im Königreiche Sachsen und ihr einfluss auf die forstwirtschaft. 219 p. 3 maps. 1908. (Sammlung von abhandlungen über abgase und rauchschäden, no. 2.)

Sind ringofengase den pflanzen schädlich? Eine zusammenfassung der in Deutschen Verein für Ton- Zement- und Kalkindustrie E. V. zur klarung der frage gepflogenen verhandlungen und der in seinem auftrage vorgenommenen untersuchungen. 143 p. 1903.

Contents: Kurze zusammenfassung der verhandlungen und untersuchungen.—Die wirkung der rauchgase von ringofenziegeleien. Clemens Winkler.—Sind ringofengase schädlich für die umliegende vegetation? E. Cramer.—Die schädlichkeit der ringofengase für die umliegende vegetation. E. Cramer.—Bericht über die untersuchung der ringofengase bezüglich ihrer schädlichkeit für die vegetation. E. Ramann.—Bericht über die untersuchung der ringofengase. E. Ramann.—Die quantitative bestimmung des fluors in tonen. W. Graf zu Leiningen-Westerberg.

Sorauer, Paul.
Handbuch der pflanzenkrankheiten. ed. 3. 2 v. Ill. 1909.

"Einfluss schädlicher gase und flüssigkeiten." v. 1, p. 711-747.

The same, ed. 2, abstract. 1908. (In Jahresbericht der Vereinigung für Angewandte Botanik, v. 6, p. 79-81.)

Discusses deleterious effects of smoke and industrial gases. Many foot-note references.

Sorauer, Paul.
Über die rotfärbung der spaltöffnungen bei Picea. 1898. (In Notizblatt des königl. botanischen gartens und museums zu Berlin, v. 2, p. 239-246.)

Special attention to above subject, but discusses also the conflict between agriculture and other industries, occasioned by injury to vegetation resulting from industrial effluvia.

Sorauer, Paul, & **Ramann,** E.
Sogenannte unsichtbare rauchbeschädigungen. 1899. (In Botanisches centralblatt, v. 80, p. 50-56, 106-116, 156-168, 205-216, 251-262.)

Exhaustive investigation including much experimental work. A few foot-note references.

Spath, & **Meyer.**
Beobachtungen über den einfluss des leuchtgases auf die vegetation von bäumen. 1873. (In Landwirtschaftlichen versuchs-stationen, v. 16, p. 336-341.)

Experimental investigation of injurious effects observed in botanical gardens, Berlin.

Stöckhardt, A.
Über die einwirkung des rauches der silberhütten auf die benachbarte vegetation, u. s. f. 1850. (In Polytechisches centralblatt, v. 17, n. s. v. 4, column 257-278.)

Stöckhardt, A.
Untersuchung junger fichten und kiefern, welche durch den rauch der Antonshütte krank geworden. 1853. (In Jahrbuch der Königl. sachs. Akademie für Forst- und Landwirthe in Tharand, v. 9, n. s. v. 2, p. 169-172.)

Considers briefly dust, smoke and fumes.

Stöckhardt, A.
Untersuchungen über die schädliche einwirkung des hütten- und steinkohlenrauches auf das pflanzenwachstum. 1872. (In Chemische ackersmann, v. 18, p. 24-47.)

Practically the same as following article.

Stoeckhardt, A.
Untersuchungen über die schädliche einwirkung des hütten- und steinkohlenrauches auf das wachsthum der pflanzen, insbesondere der fichte und tanne. 1871. (In Tharander forstliches jahrbuch, v. 21, p. 218-254.)

Pt. 1, Der hüttenrauch, (25 p.); pt. 2, Der steinkohlenrauch (torf- und braunkohlenrauch), (18 p.)
Mentions also smoke from wood burning and wood distillation.

Ueber die einwirkung des rauches der silberhütten auf die waldbäume und den forstbetrieb. 1845. (In Allgemeine forst- und jagdzeitung, n. s. v. 11, p. 132-140.)

Speaks of smoke in general, considering mainly, however, fumes from lead and silver smelters.

Vater.
Nachweis von rauchbeschäden durch die chemische analyse. 1897. (In Tharander forstliches jahrbuch, v. 47, p. 254-263.)

To arrive at conclusions of any value in determining sulphuric acid content of leaves, etc., it is necessary to make numerous tests and to compare with healthy specimens from similar localities, grown under corresponding conditions.

***Watson,** W.
Effects of fog on plants grown in the houses at Kew. 1891. (In Transactions of the Seventh International Congress of Hygiene and Demography, v. 5, p. 21-22.)

**The same,* 1891. (In Nature, v. 45, p. 16.)
Injury from heavy fogs shown to amount practically to destruction. Safest conditions of the atmosphere during fogs were low temperature, moderately dry atmosphere and diminished light, i. e. the conditions most conducive to rest from growth.

***Webster,** Angus D.
Town planting, and the trees, shrubs, herbaceous and other plants that are best adapted for resisting smoke. 211 p. 16 pl. 1910. Routledge.

Lists of trees, shrubs and other plants for the town garden, p. 200-204.
Discusses successful growing of trees, shrubs, plants and grasses under the unfavorable conditions found in large cities. Considers mainly the injurious influences common in British cities, and the vegetation best adapted to cultivation therein. Mentions parts of London where trees "have their leaves so thickly encrusted with soot and dust as to be scarcely recognizable; in fact, it is no exaggeration to say that at times the encrustation is as thick as the leaves." p. 176.

Wehmer, C.
Über farbungen und flecke der rosenblätter. 2 colored pl. with 23 fig. 1900. (In Gartenflora, zeitschrift für garten- und blumenkunde, v. 49, p. 225-229, 262-267.)

Considers in part chemical effect of the atmosphere, or injuries due to smoke.

Wieler, A[rwed Ludwig.]
Begutachtung von rauchschäden und die ursachen ihrer angeblichen mangelhaftigkeit. 1908. (In Jahresbericht der Vereinigung für Angewandte Botanik, v. 6, p. 47-72.)

Wieler, A[rwed Ludwig.]
Bericht über die rauchschädenliteratur der letzten jahre (1907). 1908. (In Jahresbericht der Vereinigung für Angewandte Botanik, v. 6, p. 73-102.)

Lengthy abstracts of 26 articles in various German publications during 1907. Deals mainly, but not entirely, with injuries to vegetation.

Wieler, A[rwed Ludwig.]
Einwirkung saurer gase auf die gärtnerischen kulturpflanzen. 1908. (In Jahresbericht der Vereinigung für Angewandte Botanik, v. 6, p. 91-92.)

Brief abstract from "Proskauer obstbauzeitung," 1908, no. 4.

***Wieler,** A[rwed Ludwig.]
Ueber die unsichtbaren rauchschäden und insbesondere über die einwirkung der salzsaure auf die laubbäume. 300 w. 1900. (In Zeitschrift für angewandte chemie, v. 13, p. 1035.)

Abstract of address before Versammlung deutscher Naturforscher und Aerzte in Aachen. Gives evidence that functions of leaf cells are destroyed by other than solid impurities. Shows harmful effect of hydrochloric acid gas.

***Wieler,** A[rwed Ludwig.]
Ueber die ursächlichen beziehungen zwischen den vegetationsschäden und den verbrennungsprodukten der kohlen. 1911. (In Rauch und staub, v. 1, p. 248-255.)

Foot-note references.

Wieler, A[rwed Ludwig.]
Untersuchungen über die einwirkung schwefliger säure auf die pflanzen, von Prof. Dr. A. Wieler, nebst einem anhange: Oster, Exkursion in den stadtwald von Eschweiler zur besichtigung der hüttenrauchbeschädigungen am 5 September, 1887. 427 p. Ill. 1905. Berlin. Borntraeger.

Comprehensive. Considers both observations and experimental work.

***Wilson,** Albert.
Great smoke cloud of the north of England and its influence on plants. 1900. (In Report of the Meeting of the British Association for the Advancement of Science, v. 70, p. 930-931.)

Abstract of paper.

***Winkler,** Clemens.
Über den einfluss des wasserdampfgehaltes saurer gase auf deren vegetationsschädlichkeit. 1896. (In Zeitschrift für angewandte chemie, v. 9, p. 370-374.)

Mentions both smelter fumes and coal smoke.

Wislicenus, Hans.
Erfolg neuer technischer abwehrvorrichtungen gegen rauchschäden. 1908. (In Jahresbericht der Vereinigung für Angewandte Botanik, v. 6, p. 85-86.)

Abstract from "Bericht über die 48. Versammlung der sächsischen Forstvereins in Stadt Wehlen 1904."

Recommends analysis, especially in cases of chronic plant disease caused by sulphurous acid. Describes apparatus very briefly.

Wislicenus, Hans.
Nachweis der schwefligen säure in der waldluft des Tharander waldes. 1898. (In Tharander forstliches jahrbuch, v. 48, p. 173-184.)
Includes tables. Records injurious effects of the constituents of smoke at long distance from source of the smoke.

Wislicenus, Hans.
Nachweis von rauchschäden durch die chemische analyse. 1908. (In Jahresbericht der Vereinigung für Angewandte Botanik, v. 6, p. 84-85.)
Abstract from "Bericht über die 48. Versammlung der sächsischen Forstvereins in Stadt Wehlen 1904."

Wislicenus, Hans.
Resistenz der fichte gegen saure rauchgase bei ruhender und bei thätiger assimilation. 4 ill. 1898. (In Tharander forstliches jahrbuch, v. 48, p. 152-172.)
Bibliographic foot-notes.
Deals with tests in artificial atmosphere.

***Wislicenus,** Hans.
Zur beurtheilung und abwehr von rauchschäden. 11 dr. 1901. (In Zeitschrift für angewandte chemie, v. 14, p. 689-712.)
Scholarly paper with considerable data in form of tables. Concerned with injuries to vegetation, with detection and estimation of these injuries, and with means for prevention.

***Woydt,** von.
Sind ringofengase schädlich für die umliegende vegetation? 300 w. 1899. (In Chemiker-zeitung, v. 23, pt. 1, p. 249.)
Discussion of E. Cramer's article with same title.

Physiological effects

***Ascher,** Louis.
Coal smoke abatement in England. 1907. (In Journal of the Royal Sanitary Institute, v. 28, p. 88-93.)
Deals mainly with mortality from acute pulmonary diseases other than tuberculosis.

***Ascher,** Louis.
Einfluss des rauches auf die atmungsorgane; eine sozialhygienische untersuchung für mediziner, national-ökonomen, gewerbe- und verwaltungsbeamte, sowie für feuerungstechniker. 66 p. 4 ill. 1905. Enke.
"Literatur," p. 38. (20 references.)
Numerous statistics, based mainly on German conditions. Shows by statistics and animal experimentation that smoke is not only a nuisance but is also injurious.

***Ascher,** Louis.
Einwirkung von rauch und russ auf die menschliche gesundheit. 400 w. 1910. (In Rauch und staub, v. 1, p. 27-28.)
Abstract from "Blätter für gesundheits-pflege," 15 Aug., 1910, p. 186.

***Ascher,** Louis.
Die nächsten aufgaben der rauchbekämpfung. 1910. (In Rauch und staub, v. 1, p. 7-10.)
Discusses the smoke problem in relation to health.

***Ascher,** Louis.
Rauchbekämpfung in der Englischen abteilung der International Hygiene-Ausstellung. 1911. (In Rauch und staub, v. 2, p. 41-42.)

***Ascher,** Louis.

Smoke nuisance in large towns. 1907. (In Engineering news, v. 58, p. 434-435.)

Abstract of paper at International Congress of Hygiene and Demography.

Considers especially harmful effects of smoke and soot on health of individuals, with special reference to tuberculosis.

Ascher, Louis.

Zur theorie und praxis der lufthygiene. 1 ill. 1907. (In Viertel-jahrs-bericht über die sitzungen der physikalisch-ökonomischen Gesellschaft zu Königsberg i. Pr. Jan.-Mar., 1907, p. 52-54.)

Briefly discusses investigation of smoke and other air impurities and relation of these impurities to disease.

***Atmospheric** pollution from coal to destroy animal life. 1913. (In Coal and coke operator, v. 16, p. 223-224.)

Outlines theory of Prof. Ludwig Pietch of Germany, who has "discovered the imminent fact that carbon dioxide . . . in the cities is well above four one-hundredths of a per cent, closely approaching the fatal poisoning proportion." Recommends closing of coal mines for a period of years, and fears that with increasing carbon dioxid content of the atmosphere, by the year 1950 the human race and animal life in general will not be able to survive the toxic effect.

Coullaud, H.

L'intoxication par les fumées chez les sapeurs-pompiers. 1909. (In Annales d'hygiène publique, ser. 4, v. 12, p. 490-541.)

Bibliography, p. 539-541.

***Derby,** George.

Inquiry into the influence of anthracite fires upon health, with remarks upon artificial moisture and the best modes of warming houses. Ed. 2, enl. 76 p. 1868. Williams.

Binder's title reads "Anthracite and health."

Concerned with supposedly injurious effects of anthracite coal as a domestic fuel, especially when burned in cast iron stoves. Recommends stoves of porcelain or of wrought iron so tightly closed that the "poisonous product of imperfect combustion" cannot escape.

***Dresdener** ausstellungsbrief; Spezialbericht, für "Rauch und staub." 1911. (In Rauch und staub, v. 1, p. 311-314, 353-357, 383-386.)

A large part of report deals with hygiene of air and light, and with injurious effects of smoke.

Freytag, Moritz.

Wissenschaftliches gutachten über den einfluss des hüttenrauches bei den fiskalischen hüttenwerken zu Freiberg auf die vegetation der benachbarten grundstücker und ganz besonders auf die gesundheit der haustiere, namentlich des rindvieh's. 1873. (In Jahrbuch für das berg- und hüttenwesen im Konigreiche Sachsen auf das jahr 1873, pt. 2, abhandlungen, p. 3-86.)

**The same, abstract.* 1873. (In Dingler's polytechnisches journal, v. 208, ser. 5, v. 8, p. 235-236.)

In the above abstract author is given as "Freitag."

***Galton,** Douglas.

Inaugural address. 1882. (In Transactions of the Sanitary Institute of Great Britain, v. 4, p. 21-59.)

Gives some space to effect of smoke-polluted atmosphere on health.

***Gefahren** des gummi-raucherns. 300 w. 1912. (In Rauch und staub, v. 2, p. 293.)

From Eduard Dettmann's "Das moderne Brasilien in seiner neuesten wirtschaftlichen entwicklung," 1912, p. 234-235.

Nature of fumes and effect on health.

***Godfrey,** Hollis.
Air. 1910. (In his "Health of the city," p. 1-29.)

Chapter dealing with air from sanitary and hygienic viewpoint. Touches briefly on injurious effects of smoke and outlook for abatement.

***Godfrey,** Hollis.
Air of the city. 1908. (In Atlantic monthly, v. 102, p. 62-71.)

Considers physiological effect of smoke and impurities in air.

***Haddon,** John.
Poisoning by coal fumes and smoke. 1890. (In British medical journal, v. 67, p. 178-179.)

Note on symptoms and recovery from poisoning by fumes.

Hanna, W.
Ueber den kohlengehalt menschlicher lungen. 1897. (In Archiv für hygiene, v. 30, p. 335-340.)

***Hessler,** Robert.
Dusty air and ill health. 352 p. Ill. 1912. Privately printed.

Confined pretty closely to dust and its effects, but deals very briefly with "Smoke and smog," p. 66, and "Smoke evil," p. 331.

***Hodgetts,** E. A. Brayley.
Smoke abatement. 1,400 w. 1900. (In British architect, v. 52, p. 202.)

**The same.* 1,400 w. (In Journal of the Sanitary Institute, v. 21, p. 35.)

Claims that air pollution by coal smoke is a greater menace to public health than any other insanitary condition now existing, and that the regions of greatest smoke production tend to become depopulated. Does not give remedies.

***Jacobi,** A.
Smoke in relation to health. 1907. (In Journal of the American Medical Association, v. 49, pt. 1, p. 813-815.)

Reviews opinions and instances showing that presence of soot and smoke in the air increase likelihood of tuberculosis.

***Liefmann,** H.
Über die rauch- und russfrage insbesondere vom gesundheitlichen standpunkte und eine methode des russnachweises in der luft. 90 p. 8 dr. 1908.

"Literatur," p. 74-90.
Investigation of smoke and dust in the air and discussion of harmful effects. Does not consider remedial measures.

The same. 1908. (In Deutsche vierteljahrsschrift für öffentliche gesundheitspflege, v. 40, p. 282-344.)

**The same, condensed.* (In Journal für gasbeleuchtung, v. 51, p. 709-710.)

Lode, A.
Staub, russ, keime. 1911. (In section "Atmosphäre," of Max Rubner's "Handbuch der hygiene," v. 1, p. 400-419.)

***Lunge,** Georg.
Injurious action of sulphurous acid (sulphur dioxide). 1903. (In his "Theoretical and practical treatise on the manufacture of sulphuric acid and alkali," ed. 3, rev., v. 1, pt. 1, p. 154-159.)

Quotes authorities as to the extent to which sulphurous acid vapors are harmful to animal and vegetable life.

***Lunge,** Georg.
Schädliche wirkungen der schwefligen säure (des hüttenrauches). 1893. (In his "Handbuch der soda-industrie," ed. 2, rev., v. 1, p. 91-95.)

***Lungenentzündung** durch raucheinatmung. 250 w. 1912. (In Rauch und staub, v. 2, p. 261.)

Abstract from "Zeitschrift für gewerbe-hygiene," 1912, no. 6, p. 138.

***Niven,** James.
Relation of smoke and health. 1911. (In Proceedings of the Conference of the Smoke Abatement League of Great Britain, Manchester, 21-22 Nov., 1911, p. 54-72.)

By Medical Officer of Health, Manchester, and deals mainly with conditions in that city. Partly statistical.
Claims that "both directly and indirectly, smoke causes serious injury to health, especially during November, December, and January. This injury is manifested in an increased respiratory mortality."

Oliver, Thomas.
Dust and fume; foes of industrial life. 1912. (In Lancet, v. 183, p. 865-871.)

Paper at International Congress of Hygiene [and Demography?], Washington, 1912.
Discusses mainly the hygienic effects of coal smoke, dust and fumes.

Plumandon, J. R.
Les poussières atmosphériques, leur circulation dans l'atmosphère et leur influence sur la santé. 130 p. [1897.]

***Pownall,** A. E.
Some considerations of the effect of air pollution on health. 14 p. n. d. (Manchester and Salford Noxious Vapours Abatement Association. Lectures on air pollution, ser. 4, No. 4.)

Discusses effects on health, caused, or at least influenced, by vitiated air. Considers smoke briefly.

***Ronzani,** Enrico.
Über den einfluss der einatmungen reizender gase der industrien auf die verteidigungskräfte des organismus gegenüber den infektiven krankheiten. 1908. (In Archiv für hygiene, v. 67, p. 287-366.)

"Bibliographie," p. 365-366.
Report of extensive experimental investigation. Considers in part the effect of sulphurous acid.

Sanitary bearings of smoke-nuisance. 1894. (In Medical news. v. 64, p. 51-52.)

Editorial.
General and indefinite.

***Smith,** R. Angus.
How far are smoke and the products of combustion arising from various manufacturing processes injurious to health? What measures ought to be taken to prevent the contamination of the atmosphere from such causes? 1866. (In Transactions of the National Association for the Promotion of Social Science, v. 10, p. 429-440.)

Discussion, p. 570-573.

**The same.* (In Chemical news, v. 14, p. 182-185.)

Deals mainly with various injurious effects of smoke. Makes a plea for moderate rather than extreme relief measures, and considers the problem largely one of education.

***Smoke** nuisance, how far are smoke and the products of combustion arising from various manufacturing processes injurious to health? What measures ought to be taken to prevent contamination of the atmosphere from such causes? 1866. (In Transactions of the National Association for the Promotion of Social Science, v. 10, p. 570-573.)

A discussion of papers by R. Angus Smith, F. C. Calvert, Peter Spence, and W. H. Griffiths.

***Smoke** prevention and public health. 1900. (In Engineering magazine, v. 19, p. 426-427.)

Reviews conclusions of papers by Hodgetts and Priestley before the Sanitary Institute showing dangers to public health from smoke.

***Soper,** George A.
Air of towns and cities. 1908. (In his "Air and ventilation of subways," ed. 1, p. 24-32.))

Physiological effects of vitiated air, considering coal smoke briefly.

Tschorn, Bernh.
Rauch-plage. 1903. (In Theodor Weyl's "Handbuch der hygiene," supplement, v. 3, lfg. 3, 1903, p. 127-200.)

"Literatur verzeichnis," p. 197. (14 references.)

Wainwright, John W.
Bituminous coal smoke; its chemistry and effects on the health of man and plants, works of art and commerce. 1908. (In Medical record, v. 74, p. 791-793.)

***Willard,** Z. A.
Smoke nuisance and health. 3 p. n. d.

Leaflet giving brief, popular presentation of effects on human health.

***Wolff.**
[Rauchplage und ihre gesundheitschädlichen folgen.] 150 w. 1907. (In Zeitschrift des Vereines deutscher Ingenieure, v. 51, pt. 1, p. 268.)

Brief abstract of address before Elsass-Lothringer Bezirksverein, on effect of smoke on health in Germany, discussing work of Ascher.

Psychological effects

(Considered broadly as effect of weather on mental action.)

***Bousfield,** William.
Smoke in the manufacturing districts. 1882. (In Art journal, London, v. 34, p. 9-10.)

Smoke is condemned as being depressing and disastrous in its effect on the natures and abilities of workers.

***Dexter,** Edwin Grant.
The child and the weather. 4 diag. 1898. (In Pedagogical seminary, v. 5, p. 512-522.)

Shows that character of day has no noticeable effect on prevalence of minor misdemeanors among school children.

***Dexter,** Edwin Grant.
Conduct and the weather; an inductive study of the mental effects of definite meteorological conditions. 89 p. 14 diag. 1899. (In Psychological review, v. 5, series of monograph supplements, v. 2, no. 6, May, 1899.)

Study of school statistics and other data, showing that for many of the misdemeanors classified the number is less than normal on cloudy days.

***Dexter,** Edwin Grant.
Drunkenness and the weather. 7 diag. 1900. (In Annals of the American Academy of Political and Social Science, v. 16, p. 421-434.)

Attempts "to demonstrate by empirical methods, certain fixed relations between definite weather conditions and the prevalence of drunkenness in the City of New York." Considers influence of temperature, wind, humidity, cloudiness, etc., concluding from the evidence available that clear and dry days which are bracing furnish slight excesses of drunkenness, partly cloudy and wet days show deficiencies, and cloudy days furnish exactly the normal number.

***Dexter,** Edwin Grant.
Ethics and the weather. 1901. (In International journal of ethics, v. 11, p. 481-492.)

Shows that in New York City suicide and various other misdemeanors are more prevalent on bright clear days and below the normal in gloomy weather.

***Dexter,** Edwin Grant.
Influence of the weather upon crime. 6 diag. 1899. (In Popular science monthly, v. 55, p. 653-660.)

Based on study of crime records of Denver, Colorado, for fourteen years. Shows that slightly more than the usual number of murders are committed on cloudy days.

***Dexter,** Edwin Grant.
School deportment and the weather. 1900. (In Educational review, v. 19, p. 160-168.)

"The number of misdemeanors was least, both for New York and Denver, upon cloudy days upon which there was precipitation, and most upon cloudy days upon which there was neither rain nor snow. For fair days the number was above the normal, but not so much as for the part cloudy."

***Dexter,** Edwin Grant.
Suicide and the weather. 1901. (In Popular science monthly, v. 58, p. 604-615.)

Shows that more suicides occur on bright days.

***Ellison,** Ralph Carr.
On the influence of the purity or impurity of the external air on the health and moral tendencies of a dense population. 1882. (In Transactions of the Sanitary Institute of Great Britain, v. 4, p. 222-227.)

***Lemon,** J. S.
Psychic effects of the weather. 1894. (In American journal of psychology, v. 6, p. 277-279.)

General observations.

***Morselli,** Henry.
Cosmico-natural influences which act on suicide. 1882. (In his "Suicide, an essay on comparative moral statistics," p. 36-79.)

Considers effect of climate and meteorological conditions.

***Rolleston,** Charles.
The cloud over English life. 1904. (In Westminster review, v. 162, p. 30-40.)

**The same, abstract.* 1904. (In American architect, v. 85, p. 43-45.)

Deals with extent of the smoke nuisance in England, with considerable attention to physiological and psychological effects.

***Weather** and mental action. 300 w. 1895. (In Popular science monthly, v. 47, p. 568.)

Paragraph suggesting intimate connection between weather and mental action, and offering testimony of a large employer to the effect that "a disagreeable day yields about ten per cent. less work than a delightful day."

Smoke Prevention

Abatement in general

***American Society of Mechanical Engineers.**

Smoke consumption. 2,500 w. Ill. 1902. (In Transactions of the American Society of Mechanical Engineers, v. 24, p. 315.)

A topical discussion.

***American Society of Mechanical Engineers.**

Topical discussion on the problem of smoke abatement. 3 diag. 1911. (In Transactions of the American Society of Mechanical Engineers, v. 32, p. 1109-1138.)

**The same.* 1911. (In Journal of the American Society of Mechanical Engineers, Feb., 1911, p. 223-252.)

**The same, abstract.* 1910. (In Power and the Engineer, v. 32, pt. 2, p. 2037-2041, 2123-2125.)

**The same, abstract.* 1912. (In American machinist, v. 37, p. 668.)

**The same, abstract translation,* "Rauchbekämpfung." 500 w. 1911. (In Rauch und staub, v. 1, p. 232.)

Presented at Boston meeting, November, 1910.
Discussion opened by D. T. Randall, in a valuable paper making following points: In localities using bituminous coal, high in volatile matter, smoke can be prevented only by installation of specially designed furnaces. Even under these conditions skill and care in firing are highly important. Properly designed automatic stokers are superior to hand-firing both in reducing smoke and in economy.

Ascher, Louis.

Die zukunft der rauchbekämpfung. 1909. (In Deutsche vierteljahrsschrift für öffentliche gesundheitspflege, v. 41, p. 382-383.)

***Baker,** Moses Nelson.

Smoke abatement. 1906. (In his "Municipal engineering and sanitation," p. 192-195.)

Brief popular outline of smoke nuisance, causes and remedies.

***Barr,** William Miller.

Catechism on the combustion of coal and the prevention of smoke; a practical treatise for engineers, firemen and others interested in fuel economy and the suppression of smoke from stationary steam-boiler furnaces, and from locomotives. 349 p. 85 ill. 1900. Henley.

Barr, William Miller.

A practical treatise on the combustion of coal, including descriptions of various mechanical devices for the economic generation of heat by the combustion of fuel, whether solid, liquid or gaseous. 306 p. 7 pl. 1879. Yohn Bros.

Smoke prevention, p. 161-162.

***Benjamin,** Charles H.
Prevention of smoke from bituminous coal. 1903. (In Engineer, Chicago, v. 40, p. 279-280.)

General review of principles and methods of smoke prevention.

***Benjamin,** Charles H.
Science of smoke prevention. 1904. (In Science, v. 42, p. 488-493.)

***Benjamin,** Charles H.
Smoke abatement. 1908. (In Proceedings of the Indiana Engineering Society, v. 28, p. 145-149.)

Discusses briefly the proximate causes of smoke evil, efficient methods of abatement, and ethical and legal questions involved.

***Benjamin,** Charles H.
Smoke and its abatement in large cities. 6 ill. 1902. (In Technology quarterly, v. 15, p. 265-271.)

General explanation of cause of smoke and means for prevention.

***Bibby,** James.
Generation of steam economically and smokelessly. 1911. (In Proceedings of the Conference of the Smoke Abatement League of Great Britain, Manchester, 21-22 Nov., 1911, p. 111-118.)

Discussion, p. 119-124.
Presentation of the more important features of smokeless combustion of coal, without loss of fuel economy and boiler efficiency. Mainly a consideration of mechanical stokers, suggesting seven points to be considered in determining the merit of any type.

***Booth,** William Henry.
Smoke prevention. 1892. (In American machinst, v. 15, Nov. 24, p. 2.)

Comment on paper of Sennett before British Association.

***Booth,** William Henry.
Smoke prevention. 1,500 w. 1898. (In American machinist, v. 21, p. 722.)

Favors mechanical draft.
With British boilers and stokers smoke prevention is more difficult than with American types.

***Booth,** William Henry.
The smoke question. 1905. (In London Times, engineering supplement, Nov. 8, v. 1, p. 296.)

Brief general article, considering bituminous coal as a smoke-producer, and methods of smoke prevention.

***Booth,** William Henry.
The smokeless combustion of bituminous fuel. 2,700 w. 1902. (In Electrical review, London, v. 51, p. 557.)

Mainly a synopsis of the conditions of combustion. Says that in the design of appliances for smoke prevention, the problems of air admission and admixture of gases have been fairly well solved but failure results through lack of proper temperature.

***Booth,** William Henry, & **Kershaw,** J. B. C.
Smoke prevention and fuel economy. Ed. 2, rev. 231 p. 79 dr. and ill. 1912. Henley.

**The same.* 194 p. Ill. 1904. Constable.

Based on Ernst Schmatolla's "Rauchplage u. brennstoffverschwendung."
Contents: The chemistry of the combustion process.—Present methods of burning fuels and their defects.—Improved methods of burning fuels.—

***Booth,** William Henry, & **Kershaw,** J. B. C.—*continued.*

The examination of the waste gases and control of the combustion process.—The legal position and the work of voluntary agencies.—Patent abstracts.—Fuel analyses, losses and costs.—Miscellaneous extracts.

Argues that smoke prevention is possible and will in time become general. Deals fully with the chemistry of combustion and the examination of waste gases. Discusses ordinary and improved methods of burning fuel and gives abstracts of British, German and United States patents on smoke preventing appliances.

***Boyer-Guillon,** A.

Suppression des fumées produites par les foyers des chaudières à vapeur. 1 diag. 9 dr. 1898. (In Génie civil, v. 33, p. 171-174, 189-193.)

Reviews history and regulations concerning smoke suppression and discusses different types of furnaces.

***Brauser.**

Prüfung von einrichtungen und feuerungen zur rauchverhütung an dampfkesseln. 500 w. 1894. (In Zeitschrift des Vereines deutscher Ingenieure, v. 38, pt. 2, p. 1437.)

Abstract of address before Aachener Bezirksverein. Discusses fuel loss due to visible smoke.

***Breckenridge,** Lester P.

Burning Illinois coal without smoke. 2,000 w. 1903. (In Engineering news, v. 59, p. 519.)

Describes necessary conditions and progress made in burning bituminous coal having a high percentage of volatile combustible matter.

***Breckenridge,** Lester P.

How to burn bituminous coal in boiler furnaces without smoke. 6 dr. 1908. (In Proceedings of the St. Louis Railway Club, v. 12, p. 259-295.)

***Breckenridge,** Lester P.

How to burn Illinois coal without smoke. 45 p. 5 diag. 9 dr. 2 ill. 1907. (In University of Illinois—Engineering Experiment Station. Bulletin 15.)

**The same, abstract.* (In Engineering magazine, v. 34, p. 1055-1057.)

Shows principles underlying perfect combustion, describing proper arrangement of boilers, furnaces, and stokers.

***Breckenridge,** Lester P.

How to burn Illinois coal without smoke. 1908. (In Boilermaker, v. 8, p. 38-40.)

Shows that horizontal fire-tube boiler is not adapted for smokeless combustion of Illinois coal. Considers efficient hand-firing, preparation of coal, etc.

***Breckenridge,** Lester P.

Smoke and smoke prevention. 5 diag. 8 dr. 1 ill. 1909. (In Proceedings of the American Water Works Association, v. 29, p. 316-352.)

Explains principles of smokeless combustion, shows the Ringelmann scheme for estimating relative density of smoke, and describes types of furnaces and boilers.

***Bryan,** William H.

Problem of smoke abatement. 1906. (In American machinist, v. 29, pt. 2, p. 52-54.)

**The same.* (In Scientific American supplement, v. 62, p. 25582-25584.)

Good popular outline of the nature of the problem and the attempted solutions. Covers in a general way the devices which have proved reasonably successful.

***Bryan,** William H.
Smoke abatement; the rational solution of the problem. 5,000 w. Ill. 1900. (In Cassier's magazine, v. 19, p. 17.)

Considers conditions of successful smoke abatement and the devices in most general use.

***Bryan,** William H.
Smoke prevention; practical methods in use for preventing the formation of smoke in steam-boiler furnaces. 1904. (In Engineering magazine, v. 26, p. 745-747.)

**The same.* (In Railroad gazette, v. 35, p. 925-926.)

Summary of address before students at Purdue University. Considers use of smokeless fuels, furnaces causing little smoke and automatic stokers.

***Cary,** Albert A.
Prevention of smoke. 4,000 w. 1906. (In Engineering record, v. 53, p. 514.)

Deals with grate and furnace design, intelligence in the boiler room and scientific methods of hand-firing.

***Cary,** Albert A.
Smoke investigations in and out of furnace. 4 dr. 1912. (In Iron age, v. 90, p. 1155-1157.)

Faulty furnace construction and improper charging methods are considered as causes of smoke, and method of determining atmospheric pollution and operation of automatic smoke recorder are described.

***Cary,** Albert A.
Smokeless combustion. 3 dr. 1906. (In Engineer, Chicago, v. 43, p. 303-305.)

"Abstract of a discussion before the Society of Chemical Industry." (Does not appear in their "Journal.")

***Cary,** Albert A.
Suppression of smoke in steam plants using bituminous coal. 30,000 w. Ill. 1902. (In Iron age, v. 70, Oct. 2, p. 3; Oct. 9, p. 3; Oct. 16, p. 16; Oct. 23, p. 14; Oct. 30, p. 20; Nov. 13, p. 23; Nov. 27, p. 10.)

Valuable paper giving at length the chemistry of complete and incomplete combustion; various furnaces and best methods for hand firing; devices for heating and distributing air above and beyond the fire bed; steam jets for mixing combustible gases with the air supply; double furnaces; down draft furnaces and underfed furnaces.

***Chanter,** John.
Description of a furnace for economizing fuel and preventing smoke. 200 w. 1843. (In Report of the British Association for the Advancement of Science, v. 13, p. 99.)

Abstract.

***Clark,** Daniel Kinnear, *editor.*
Fuel; its combustion and economy. 394 p. 144 ill. 1879.

Consists of abridgments of "Treatise on the combustion of coal and the prevention of smoke," by C. W. Williams, and "The economy of fuel," by T. S. Prideaux, with additions on "Fuels—their combustion and economical use," by D. K. Clark.

***Cochrane,** John Llewellyn.
Government solves the smoke problem. 3 ill. 1909. (In American review of reviews, v. 39, p. 192.)

Briefly reviews lines of work carried on by the Technologic Branch of the Geological Survey. Investigations regarding utilization of low-grade fuels, use of central heating plants, etc.

***Coes,** Harold V.
Smoke prevention or smoke consumption. 3 diag. 8 dr. 22 ill. 1909. (In Engineering magazine, v. 37, p. 395-405, 517-540, 744-754.)
Explains cause of smoke and principles of smokeless combustion, describes devices for use with hand-fired furnaces and mechanical apparatus for boiler firing.

***Coles,** W. R. E.
Smoke abatement. 1883. (In Transactions of the Sanitary Institute of Great Britain, v. 5, p. 335-345.)
Touches generally on the cause of the smoke evil and the probability of its abatement.

***Coles,** W. R. E.
Smoke abatement. 1885. (In Transactions of the Sanitary Institute of Great Britain, v. 7, p. 218-228.)
Considers hygienic, moral and economic aspects of the question, and methods and prospects of improvement.

***Daelen.**
[Verhütung von kohlenrauch.] 800 w. 1895. (In Zeitschrift des Vereines deutscher Ingenieure, v. 39, pt. 2, p. 1444.)
Abstract of address before Niederrheinischer Bezirksverein. General treatment.

***Dircks,** Henry.
On the prevention of smoke from engine boilers and other furnaces. 400 w. 1843. (In Report of the British Association for the Advancement of Science, v. 13, p. 98.)
Abstract, giving summary description of Argand furnace invented by C. W. Williams.

***Dircks,** Henry.
On the production and prevention of smoke. 200 w. 1843. (In Report of the British Association for the Advancement of Science, v. 13, p. 39.)
Abstract, referring particularly to Williams's methods and to his Argand furnaces.

***Duncan,** D. J. Russell.
Smoke abatement. 1887. (In Transactions of the Sanitary Institute of Great Britain, v. 9, p. 308-327.)
Discussion, p. 335.
Reviews legislation on the subject and work of the National Smoke Abatement Institution. Briefly discusses London fogs.

***Dunsing.**
[Rauchverbrennung.] 1898. (In Zeitschrift des Vereines deutscher Ingenieure, v. 42, pt. 1, p. 700-701.)
Abstract of address on general subject of smoke prevention before Hannoverscher Bezirksverein.

***Economy** of fuel and prevention of smoke. 1868. (In English mechanic and mirror of science, v. 7, p. 486-487.)
Discusses Wigan tests, stating that with proper care smoke nuisance can be abolished.

***Fairbairn,** William.
On the consumption of fuel and the prevention of smoke. 2 diag. 1 dr. 1864. (In his "Useful information for engineers," ser. 1, Ed. 4, p. 171-194.)
Considers elementary constituents of coal and other fuels; relative proportions of furnace, and forms of boilers; temperature of furnace and surrounding flues.

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***Fairbairn,** William.

On the economy of fuel, concentration of heat, and prevention of smoke. 2 diag. 4 ill. 1864. (In his "Useful information for engineers," ser. 1, Ed. 4, p. 195-218.)

"Appendix to the preceding," 1 ill. p. 219-222.

Continuation of his lecture "On the consumption of fuel," p. 171-194.

Recommends instruction of firemen; regulation of furnace draft by damper; keeping of furnace and grate-bars free from clinker; heat insulation for boilers, steam-pipes "and every part exposed to the atmosphere;" air diffusion to avoid cooling effect; use of pyrometer and sight holes to determine proper working of furnace; and premium to firemen "on the quantity of coal saved."

***Fairbairn,** William, *and others.*

Report . . . to the Dean of Guild Court of Glasgow. 1864. (In appendix to his "Useful information for engineers," ser. 1, Ed. 4, p. 353-364.)

Report on investigation of complaint against a cotton factory. Reviews principles of smoke prevention outlining remedies and directions. "The whole secret of economy in combustion, and the absence of smoke, is plenty of boiler space."

*"Further report." (In *same,* p. 364-365.)

The same. (In *same,* Ed. 2, 1856, p. 349-360.)

***Fletcher,** Alfred E.

Means at our disposal for preventing the emission of smoke from factories and from dwelling houses. 1891. (In Transactions of the Seventh International Congress of Hygiene and Demography, v. 5, p. 28-37.)

Considers briefly mechanical stoking, use of gaseous fuel, etc. Gives many analyses of chimney gases, with notes as to conditions.

***Fletcher,** Herbert.

Smoke abatement. 1887. (In Transactions of the Sanitary Institute of Great Britain, v. 9, p. 303-308.)

Discussion, p. 335.

General consideration of harmful effects of smoke and means of prevention.

***Fletcher,** Thomas.

Smokeless houses and manufactories. 1885. (In Builder, London, v. 48, p. 510-511.)

Lecture at the Parkes Museum.

Gives facts as to smokeless equipment used at author's home and manufacturing plant.

***Frage** der rauchverhütung. 1901. (In Zeitschrift des Vereines deutscher Ingenieure, v. 45, pt. 1, p. 464-465.)

Presents measures of the Prussian "Ministerium für Handel und Gewerbe."

***Frary,** H. D.

Smoke prevention in steam boiler plants. 8,000 w. 1910. (In Minnesota engineer, v. 18, p. 71, 144.)

Analyzes the causes which permit formation of smoke. Describes and illustrates furnace, stoker and boiler arrangements for smoke prevention.

Frölich (B.) & Co. (Leipzig.)

Die rauchplage in den städten und ihre beseitigung. Denkschrift für die mitglieder der XXII versammlung des deutschen Vereins für öffentliche Gesundheitspflege zu Karlsruhe gewidmet von B. Frölich & Co. Bau-Anstalt für Rauch- und Russverbrennungs-Apparate. 38 p. 2 pl. [1897.]

***Fumivore.** (In Grand dictionnaire universel du 19e siècle, par Pierre Larousse, v. 8, p. 877.)

***La fumivorité.** 2 dr. 1893. (In Génie civil, v. 23, p. 365-366.)

Reviews devices and methods that will promote smokelessness: use of powdered coal as fuel, washing of smoke, etc.

***Gebhardt,** George Frederick.

Steam power plant engineering. Ed. 3, rev. 902 p. 1910. Wiley.

"Smoke prevention, furnaces, stokers," 21 dr. p. 124-151.—"Hamler-Eddy smoke recorder," p. 749.—"Ringelmann smoke chart," p. 843-844.—"Rules for firemen," p. 879-880.—"Parsons smokeless furnace; Heinrich smokeless furnace," p. 248-249.—Bibliography, p. 151.

**The same.* Ed. 1. 816 p. 1908. Wiley.

Bibliography, p. 109.

***Gloom** of useless smoke. 1908. (In World's work, v. 17, p. 10865-10866.)

Editorial review of smoke prevention work in various cities.

***Goss,** W. F. M.

Steps in the development of a smokeless city. 1907. (In Municipal engineering, v. 32, p. 252-255.)

Takes up question of reducing smoke from five sources: large furnace fires, large boiler plants, small boiler plants, domestic fires and locomotive fires.

***Grabau.**

Rauchverbrennung. 1896. (In Zeitschrift des Vereines deutscher Ingenieure, v. 40, pt. 1, p. 642-644.)

Abstract of paper and discussion before Hannoverscher Bezirksverein, 20 Dec., 1895.
Discusses properties of fuels, and nature and causes of smoke, and presents advantages of coal dust firing.

***Graham,** John William.

Destruction of daylight; a study in the smoke problem. 152 p. Ill. 1907. Allen.

"Bibliography," p. 147-148.
An attack on both the industrial and domestic sources of the smoke nuisance, recommending more stringent legislation in England. Presents the case for smoke abatement to the general public and is not intended for the expert.

***Grahl,** de.

Ueber die technischen massnahmen zur verhütung der russ- und rauchplage in grossstädten. 1911. (In Rauch und staub, v. 1, p. 386-395.)

Address, 16 May, 1911, before "Deutsche Gesellschaft für öffentliche Gesundheitspflege."
Thorough discussion. Suggests ten points for consideration, including education of firemen and employers; supervision of firing; use of smokeless fuel; establishment of central heating plants; wider use of internal combustion motors; organization of smoke abatement societies.

***Grimshaw,** Robert.

Rules for smokeless consumption of fuel. 1909. (In Engineering and mining journal, v. 87, p. 1142.)

Discussion of rules laid down by the "Magdeburger Verein für Dampfkesselbetrieb."

***Guillemain,** C.

Theorie und praxis der staubverdichtung und der reinigung und entstaubung von gasen auf grund theoretischer studien und praktischer erfahrungen, unter benutzung der umfangreichen patent-

***Guillemain,** C.—*continued.*
literatur, für industrielle, hüttenleute, chemiker, techniker, gewerbeaufsichtsbeamte, hygieniker in gemeinfasslicher weise zusammenfassend dargestellt. 54 p. 1911. Knapp.
Mentions smoke and soot briefly.

***Haier, F.**
Bericht über rauchfreie dampfkesselanlagen in Sachsen. 12,000 w. 1897. (In Zeitschrift des Vereines deutscher Ingenieure, v. 41, pt. 1, p. 461, 484.)
Lengthy review of a report by J. L. Lewicki. Considers numerous fuels and furnaces.

Haier, F.
Maasregeln gegen die rauchbelästigung in den städten. 1899. (In Deutsche vierteljahrsschrift für die öffentliche gesundheitspflege, v. 32, p. 155-175.)
With discussion.
Valuable paper, considering both industrial and domestic firing, presenting view that ordinances alone will avail nothing. Education is necessary, and while good devices are in existence, none is adapted to all cases, and much depends on individual care and attention of the fireman. Coke and gas are recommended for domestic fires.

***Haier,** F.
Die rauchfrage, die beziehungen zwischen der rauchentwicklung und der ausnutzung der brennstoffe, und die mittel und wege zur rauchverminderung im feuerungsbetrieb. 15,000 w. Ill. 1905. (In Zeitschrift des Vereines deutscher Ingenieure, v. 49, pt. 1, p. 20, 83, 167.)
**The same. translated by William Wachsmann.* 47 p. Ill. 1905. (In Journal of the American Society of Naval Engineers, v. 17, p. 630.)
Theoretical article giving formulas for combustion, for heat loss, steam generation, etc. Tables show results of many tests.

***Hale,** R. S.
Smoke prevention. 1904. (In American architect, v. 85, p. 45-47.)
**The same, condensed.* (In Engineering magazine, v. 27, p. 983-985.)
Extracts from report issued by Mutual Boiler Insurance Company.
Takes position that smoke can not be entirely eliminated, but that its evils can be diminished. Shows that mechanical stokers do not necessarily promote efficiency.

***Hartman,** John M.
Notes on burning bituminous coal. 8,000 w. Ill. 1904. (In Proceedings of the Engineers' Club of Philadelphia, v. 21, p. 158.)
Discussion.
Considers conditions of combustion and describes several automatic stokers and a proposed type for hand-firing. Includes reports of some investigations and the smoke law in Philadelphia.

***Harvey,** Gordon.
Presidential address [at Smoke Abatement League Conference]. 1911. (In Proceedings of the Conference of the Smoke Abatement League of Great Britain, Manchester, 21-22 Nov., 1911, p. 7-8.)
Discusses briefly the feasibility of smoke abatement through awakened public sentiment, and scientific treatment of problems.

***Hays,** Joseph Weller.
Combustion and smokeless furnaces. 15 dr. 101 p. 1906. Hill.
"Authorities cited," p. v-vi. (56 references.)
Designed for owners and operators of steam power plants. Discusses the broad question of smoke abatement briefly and so far as possible in form suitable for non-technical readers.

***Hennig**, Richard.
Bekämpfung der rauch- und nebelplage. 1913. (In Das weltall, illustrierte zeitschrift für astronomie und verwandte gebiete, v. 13, p. 159-164.)

Hering, C. A.
Die verdichtung des hüttenrauches; eine gedrängte uebersicht über alle bekannt gewordenen vorrichtungen und verfahren zum auffangen des flugstaubes und zur beseitigung des schädlichen einflusses desselben sowie der sauren gase, welche im hüttenrauche enthalten sind. 72 p. 86 fig. Stuttgart. Ed. 2. 1888.

"Litteratur über verdichtungsarten und vorrichtungen," p. 61-62.
"Litteratur über die schädlichen wirkungen des hüttenrauchs," p. 62-63.

Herrmann, Raimund.
Verhütung des schornsteinrauches und unbedingte brennstofferspamis. 38 p. Ill. 1905.

Trade literature. Discusses furnaces for various purposes, and abstracts patent literature.

***Horner**, Joseph G. *editor.*
Smoke, smoke prevention. n. d. (In Encyclopædia of practical engineering and allied trades, v. 8, p. 227-228.)

Refers also to articles under Chimney. Forced draft. Gas producers. Induced draft. Mechanical stokers.

Howard, John L.
Coal combustion and smoke prevention. 1898. (In Journal of electricity, v. 6, p. 51-53.)

Brief survey of the character and composition of fuels, the principles of combustion and the conditions that favor its completeness.

***Hunt**, Robert, *editor.*
Smoke, prevention of, or consumption of. 1 dr. 1872. (In Ure's dictionary of arts, manufactures and mines, ed. 6, v. 3, p. 689-692.)

*Is the smoke nuisance curable? 4,000 w. 1853. (In Chambers's Edinburgh journal, v. 19, p. 245.)

Answers in the affirmative and outlines the advances made in various parts of Great Britain.

Karlsruher Bezirksverein deutscher Ingenieure.
Rauchverzehrungsfrage. Bericht. 62 p. 1884.

**The same, review.* 200 w. 1884. (In Zeitschrift des Vereines deutscher Ingenieure, v. 28, pt. 1, p. 434.)

***Kent**, William.
Smoke prevention. 1910. (In Journal of the Engineers' Society of Pennsylvania, v. 2, p. 307-311.)

Article contributed by the author to "Report on smoke abatement" of the Syracuse Chamber of Commerce.
Considers conditions under which smoke prevention is possible.

***Kent**, William.
Smokeless combustion of soft coal. 1,200 w. Ill. 1899. (In Stevens Institute indicator, v. 16, p. 373.)

Gives reasons for smoke and describes author's patent furnaces as applied to water-tube boilers.

***Kerley**, John A.
Smoke abatement. 1913. (In Cold storage and ice trade journal, v. 45, p. 53-55.)

Paper before Middle States Ice Producers' Exchange, Columbus, O., 18 April, 1913. General discussion. The study of legislation referred to is that carried on at the University of Pittsburgh.

***Kershaw,** John B. C.
Die frage der rauch- und staubbekämpfung auf der 82. jahresversammlung der "British Association for the Advancement of Science" in Dundee, 4. bis 11. September, 1912. Spezialbericht für "Rauch und staub." 1912. (In Rauch und staub, v. 3, p. 1-4.)

Brief report with abstracts of papers.

***Kershaw,** John B. C.
Smoke abatement; two typical reports. 1910. (In Electrical review, London, v. 67, p. 83-84.)

Reviews reports for 1909 of the London Coal Smoke Abatement Society and of the Hamburg Verein für Feuerungsbetrieb und Rauchbekämpfung.

See also editorial, p. 81.

***Kershaw,** John B. C.
Smoke abatement lectures at Liverpool University. 1911. (In Rauch und staub, v. 1, p. 395-398.)

Translation. Brief reports in German of six lectures: Hawksley on Significance of pure air in public hygiene.—Kershaw on Solid fuels and scientific principles of combustion.—Kershaw on Examination of gases of combustion and control of firing.—Watkinson on Construction of boiler plants, firing and draft.—Macauley on Hand firing.—Macauley on Mechanical stoking.

See also author's paper, "Ein neues stadium der rauchbekämpfung in England," announcing these lectures.

***Kershaw,** John B. C.
Smoke prevention in factories and electric supply stations. 1907. (In Journal of the Society of Arts, v. 55, p. 513-518.)

Discussion, p. 518-522.

Takes up principles of smokeless combustion, practical methods for smoke prevention and methods employed by Hamburg Smoke Abatement Society. Concludes that with properly designed plant and properly trained firemen smokeless combustion is assured.

***King,** R. P.
Smoke prevention. 2 ill. 1904. (In Proceedings of the Indiana Engineering Society, v. 24, p. 73-77.)

**The same, condensed.* (In Engineering news, v. 51, p. 78.)

Brief general review of devices for prevention of smoke.

***Knight,** Edward Henry, *comp.*
Smoke-burning furnace. Smoke-consumer. Smoke consumption. Smokeless furnace. 2 ill. c1883. (In Knight's new mechanical dictionary, p. 824-825.)

Notes, with brief bibliographies.

***Knight,** Edward Henry, *comp.*
Smoke-condenser. Smoke-consuming furnace. 5 ill. c1876. (In Knight's American mechanical dictionary, v. 3, p. 2224-2226.)

Landreth, Olin Henry.
Smoke prevention. Report on smoke prevention submitted by Olin A.(?) Landreth . . . professor of engineering . . . Vanderbilt University. 10 p. 1893. (In Tennessee—State Board of Health. Bulletin, v. 8. May, 1893, supplement.)

"Partial list of titles [47] pertaining to smoke prevention," p. 10.

**The same, abstract.* (In Engineering news, v. 29, p. 547.)

Does not consider individual devices but gives broadly the evils of smoke and the principles of smokeless combustion.

Original report signed Olin H. Landreth. Gives ordinances of several cities.

Lov, Adolf.
Die lösung der rauch- und russfrage durch eine neue theorie der rauchverbrennung nebst praktischer anleitung zur ausführung derselben. 36 p. 1899. Krayn.

***Lueger,** Otto, *comp.*
Feuerungen für rauchfreie verbrennung. 2 ill. (In Lexikon der gesamten technik und ihrer hilfswissenschaften, ed. 2. rev., v. 4, p. 15-17.)
"Literatur," p. 18-19.

***Mabery,** C. F. & **Benjamin,** C. H.
Economy in combustion and smoke prevention. 4,000 w. 1896. (In Journal of the Association of Engineering Societies, v. 16, p. 159.)
Discussion.
Dr. Mabery considers the subject from a chemical, Prof. Benjamin from a mechanical standpoint.

***McBride,** O. R.
Methods and means of smoke abatement. 1913. (In Proceedings of the Engineers' Club of Philadelphia, v. 30, p. 1-11.)
Author is (1913) mechanical engineer with the "Smoke Investigation" of the Department of Industrial Research, University of Pittsburgh.
General consideration of methods of smoke prevention and their relative merits.

***McCarty,** Richard J.
The smoke problem. 4,000 w. 1895. (In Street railway journal, v. 11, p. 809.)
Considers very briefly the good and bad features of a large number of devices. Believes that smoke production can be decreased, but that total suppression is impracticable.

***Mason,** Frank H.
Smoke consumption and economy of fuel. 1899. (In United States—Consular reports, v. 60, p. 491-494.)
**The same.* (In American architect and building news, v. 65, p. 36-37.)
**The same, condensed.* (In American machinist, v. 22, p. 511.)
Describes process for burning low-grade fuels without smoke, based on German patent of Paul Cornelius. Heated air is injected into the combustion chamber.

***Mason Regulator Co., Boston,** *pub.*
Key to steam engineering. Ed. 5. 174 p. 1912.
Copyright date is 1892.
Part 2, "Combustion of coal chemically considered," p. 67-83. "Combustion of coal practically considered," p. 84-102.
Discusses briefly the formation of smoke, and mentions fallacy of "combustion of smoke," arguing for "prevention" as the only logical course.

*[**Masson,** David Orme.]
Smoke abatement. 3,800 w. 1887. (In Encyclopædia Britannica, ed. 9, v. 22, p. 179-183.)
Brief bibliography, p. 183.
History, combustion, fuels and methods.

*[**Masson,** David Orme, & **Chubb,** L. W.]
Smoke abatement. 1911. (In Encyclopædia Britannica, ed. 11, v. 25, p. 275-277.)
Brief bibliography, p. 277.
Includes brief historical review. Describes and discusses best practice.

***Mehrtens,** John H.

Die lösung der rauchschaden-frage. 1907. (In Glasers annalen für gewerbe und bauwesen, v. 61, p. 176-182, 205-210.)

General discussion and consideration of methods of avoiding the production of smoke, by choice of fuel or firing devices. Some attention is given to past attempts at smoke abatement, especially in German cities.

Neuere dampfkesselkonstruktionen und dampfkesselfeuerungen mit rücksicht auf rauchverbrennung. 50 pl. 1890. Stankiewicz, Berlin.

**The same, review.* 200 w. 1890. (In Zeitschrift des Vereines deutscher Ingenieure, v. 34, pt. 2, p. 1182.)

***Neuerungen** auf dem gebiete der schornstein-reinigung. 1912. (In Rauch und staub, v. 2, p. 292-293.)

Abstract from "Technisches gemeindeblatt," 1912, no. 3-4.
Mainly a review of recent German patents.

***Nicholson,** William.

Practical smoke abatement. 1907. (In Electrical engineer, London, v. 46, p. 454-456, 483-485.)

Reviews the different sources from which smoke is produced and discusses smoke ordinances and their administration in different localities.

***Nicholson,** William.

Smoke abatement. 1903. (In Journal of the Sanitary Institute, v. 24, p. 749-757.)

Gives steps for prevention of smoke evil. Metallurgical and domestic smoke are considered especially.

***Nicholson,** William.

Smoke abatement; a manual for the use of manufacturers, inspectors, medical officers of health, engineers, and others. 256 p. Ill. 1905.

Account of smoke abatement movement and of legislation, particularly in Great Britain. Discusses also means used to mitigate the smoke nuisance.

***Pasinski,** v.

Gegenwärtige stand der rauchbekämpfung. 1910. (In Rauch und staub, v. 1, p. 69-72.)

Reviews progress made in smoke prevention, and concludes that, from technical standpoint, problem is solved.

***Perkins,** George H.

International Smoke Abatement Exhibition, held in London, March and April, 1912. 12 p. 1912. (In Journal of the American Society of Mechanical Engineers, Oct., 1912, v. 34, p. 1545-1556.)

**The same, with discussion.* 1912. (In Proceedings of the Engineers' Club of Philadelphia, v. 30, p. 12-23.)

Discussion, p. 23-30.
Abstract of informal report to trustees of Lowell Textile School, Lowell, Mass., who delegated the writer to attend the Conference. Summarizes papers at Conference, discusses exhibits, and outlines present (1912) status of smoke abatement in various countries.

***Popplewell,** W. C.

Prevention of smoke combined with the economical combustion of fuel. 203 p. Ill. 1901.

Contents: Fuels and combustion.—Combustion in ordinary hand-fired boilers.—Stoking by mechanical means.—Powdered fuel firing.—Gaseous fuel.—The testing of boilers, and smoke observations.—Some standard smoke tests.—The legal aspect of the smoke question.—The means to be adopted for lessening the smoke in our atmosphere.

Chiefly a compend of information regarding the burning of soft coal; discusses evils of smoke, chemistry of combustion, conditions of production and prevention of smoke, and illustrates many furnaces—chiefly for

***Popplewell,** W. C.—*continued.*

steam boilers—which have been more or less successful. Includes hand and machine stoking; powdered and gaseous fuels. Given reports of various smoke commissions and a summary of British legislation on the subject.

***Pradel.**

Gegenwärtige stand der gliederkesselindustrie. 25 dr. 1910. (In Zeitschrift des Vereines deutscher Ingenieure, v. 54, pt. 2, p. 1225-1233.)

**The same, abstract.* 250 w. 1910. (In Rauch und staub, v. 1, p. 92-93.)

Discussion of smokeless fuels and of various types of boilers and furnaces.

***Priestley Club, Leeds.**

Smoke abatement. 1882. (In Architect, v. 27, p. 330-331.)

**The same.* 1882. (In American architect and building news, v. 11, p. 283-284.)

Abridged report of discussion opened by Prof. Rucker. Considers preventive methods in general, with some attention to mechanical methods.

***Primrose,** John Ure.

Smoke problem. 1904. (In Transactions of the Royal Sanitary Institute, v. 25, p. 668-679.)

General presentation of the extent to which cities may be freed from smoke and of methods of procedure.

***Rambousek,** J.

Schutz gegen schädliche emanationen der chemischen industrie Englands. 1913. (In Rauch und staub, v. 3, p. 106-109.)

Translated from 1911 report of Alkali Act Inspector.

***Randall,** D. T.

Smoke problem at boiler plants; a preliminary report. 26 p. 1908. (United States—Geological Survey. Bulletin 334.

**The same, rev. by S. B. Flagg.* 31 p. 1912. (United States—Bureau of Mines. Bulletin 39.)

"Selected bibliography," p. 25-31.

Discusses general conditions in U. S., the ordinances of 17 American cities, the production of smoke, and smoke prevention in boiler plants. Recommends further study but concludes that "enough is now (1912) known to enable an engineer to design and operate a steam plant without objectionable smoke."

Bibliography includes books, official reports and papers in technical journals and transactions.

***Randall,** D. T. & **Weeks,** H. W.

Smokeless combustion of coal in boiler plants, with a chapter on central heating plants. 188 p. 40 fig. 1909. (United States—Geological Survey. Bulletin 373.)

**The same, rev. by Henry Kreisinger.* 1912. (United States—Bureau of Mines. Bulletin 40.)

**The same, abstract.* 1909. (In Engineering magazine, v. 37, p. 429-431.)

**The same, abstract.* 1909. (In Railway and engineering review, v. 49, p. 348-349.)

**The same, abstract.* 1910. (In Journal of the Society of Chemical Industry, v. 29, pt. 1, p. 201-202.)

**The same, review.* 100 w. 1909. (In Journal of industrial and engineering chemistry, v. 1, p. 483.)

Valuable monograph, based on data from 284 industrial plants following an inspection of between 400 and 500 plants in 13 American cities. Concludes that bituminous coal rich in volatile matter can be burned

***Randall,** D. T. & **Weeks,** H. W.—*continued.*

without smoke, and that even when banked fires have to be quickly forced there need be no objectionable smoke. No one type of mechanical stoker admits of general application. Briquetting affords a means of burning slack coal smokelessly. Washed coal burns more quickly than unwashed, but produces more smoke in a hand-fired furnace. Admission of air during and immediately after firing reduces the amount of black smoke.

***Rauch.** Rauchverbrennung. [with insert.] "Rauchverbrennungs-apparate." iv p. 15 dr. 1896. (In Meyers Konversations-lexikon, ed. 5, v. 14, p. 484-485, 488-489.)

***Rauch.** Rauchverhütung. 1895. (In Brockhaus' Konversations-lexikon, ed. 14, rev., v. 13, p. 638, 640-641.)

***Rauchverbrennung** und ausnutzung der brennmaterialien. 34 dr. 1884. (In Zeitschrift für bauwesen, v. 34, p. 95-112.)

**The same, condensed.* 1,000 w. (In Zeitschrift für spiritusindustrie, v. 7, p. 374.)

Describes and illustrates smoke-preventing devices at International Smoke Abatement Exhibition in London, 1881.

***Raworth,** John S.

The prevention of smoke. 1,200 w. 1902. (In Electrician, v. 49, p. 911.)

Results of tests made with the Wilson process of injecting into the furnace a very minute quantity of nitrate of soda in solution, in combination with sufficient air to produce perfect combustion of the gases.

***Robinson.**

[Rauch- und russplage in grosseren städten und die möglichkeit ihrer verhütung. 500 w. 1903. (In Zeitschrift des Vereines deutscher Ingenieure, v. 47, pt. 1, p. 98.)

Abstract of address before Westfälischer Bezirksverein.

Considers boiler and furnace construction as important factors, and discusses main features.

***Schmitz.**

[Fortschritte in der bekämpfung der rauch- und russplage. 150 w. 1908. (In Zeitschrift des Vereines deutscher Ingenieure, v 52, pt. 2, p. 1243.)

Brief abstract, with a few statistics, from paper before Braunschweiger Bezirksverein.

***Schwarz,** H.

Zur kritik der rauchfreien feuerungen. 1 dr. 1858. (In Dingler's polytechnisches journal, v. 148, p. 133-137.)

**The same.* 1859. (In Zeitschrift des Vereines deutscher Ingenieure, v. 3, p. 114-116.)

Discusses various fuels and describes and illustrates one type of furnace.

***Smoke.** 700 w. 1898. (In Engineer, London, v. 86, p. 569.)

Editorial on the English agitation concerning smoke abatement.

***Smoke.** 1910-1912. (In American year book, v. 1, p. 236-237; v 2, p. 256-259; v. 3, p. 217-218, 574-576.)

Good annual summary of progress in smoke abatement.

***Smoke** abatement. 1,200 w. 1882. (In American architect, v 11, p. 283.)

A general discussion followed by resolutions expressing confidence in the practicability of smoke prevention.

***Smoke** abatement. 1883. (In Nature, v. 28, p. 278-279.)

Reviews proceedings of meeting in London to consider steps toward reduction of smoke nuisance.

***Smoke** abatement. 1883. (In Saturday review, v. 55, p. 174-175.)

Editorial, discussing suggestions in connection with recent smoke abatement exhibitions.

***Smoke** abatement. 1,000 w. 1890. (In Industries, v. 9, p. 454.)

Editorial, discussing status of movement against smoke production.

***Smoke** abatement. 1908. (In Electrochemical and metallurgical industry, v. 6, p. 24-25.)

Editorial, reviewing discussions and recommendations of Committee of Syracuse Chamber of Commerce.

***Smoke** abatement meeting. 1912. (In Power, v. 36, p. 588-589.)

Mainly condensed report of meeting of American Society of Mechanical Engineers, 8 Oct., 1912. (See Perkins, George H.)
See also editorial, p. 538.

***Smoke** prevention. 1889. (In Engineer, London, v. 68, p. 77-78.)

Editorial, reviewing and discussing annual report of Chief Inspector of Alkali Works.

***Smoke** prevention. 1,800 w. 1896. (In Engineering news, v. 35, p. 9.)

Editorial, taking the position that smokeless combustion is practicable, and dependent merely upon proper design and operation of equipment.

***Sumner,** John.

Smoke nuisances and their abatement. 1898. (In Transactions of the Sanitary Institute of Great Britain, v. 19, p. 110-111.)

Abstract.
General statement of attitude of authorities toward smoke production.

***Süpfle.**

Die rauchplage und ihre bekämpfung. 1910. (In Rauch und staub, v. 1, p. 56.)

Abstract of address at "Sitzung des Vereins Freiburger Aerzte," 17 June, 1910. From "Munch. med. wochenschrift," 1910, p. 1914.

***Syracuse, N. Y.,** Chamber of Commerce.

Report upon smoke abatement; an impartial investigation of the ways and means of abating smoke, results obtained in other cities, merits of patented devices, together with practical suggestions to the Department of Smoke Abatement, the steam plant owner and the private citizen. 42 p. 1907.

Study of problem, considering suitable ordinance, available fuels, principles of combustion, formation of smoke and methods of prevention.

***Tait,** Lawson, & **Hill,** Alfred.

Prevention of smoke. 1882. (In Architect, v. 27, p. 75.)

Report based on "Exhibition of Smoke-preventing Appliances," 1882, at South Kensington. By Chairman of the Health Sub-Committee of Birmingham, and Medical Officer of Health for the same borough.

***Thomson,** George Carruthers.

On the prevention of smoke from the chimneys of boiler furnaces. 2 folding pl. 1888. (In Transactions of the Institution of Engineers and Shipbuilders in Scotland, v. 32, p. 67-108.)

**The same, condensed.* (In Industries, v. 4, p. 70.)

General consideration of annoyance caused by production of smoke, legal aspects in Great Britain, and methods and apparatus for doing away with smoke.

Thomson, George Carruthers.
Smoke abatement with reference to steam-boiler furnaces. 1895. (In Proceedings of the Philosophical Society of Glasgow, v. 26, p. 148-173.)

By "Engineer to the late Smoke Abatement Association."
History of attempts at smoke abatement, especially in Scotland; also discussion of methods of firing with results of many tests.

***Thurston,** R. H.
Suppression of smoke. 1,200 w. 1899. (In Science, v. 32, n. s. v. 9, p. 55.)
**The same.* (In Scientific American supplement, v. 47, p. 19331.)
Comments on activities of different cities.

***Walsh,** George Ethelbert.
Smokeless cities of to-day. 1907. (In Harper's weekly, v. 51, p. 1139.)
Reviews remarkable progress in abatement of smoke during past five years.

***Weinlich.**
Rauchplage in den städten und die mittel der abhilfe. 800 w. 1884. (In Zeitschrift für spiritusindustrie, v. 7, p. 1079-1080.)
See also paper by Weinlig.

***Weinlig,** R.
Rauchplage in den städten und die mittel der abhilfe. 1884. (In Zeitschrift des Vereines deutscher Ingenieure, v. 28, pt. 2, p. 915-918.)
**The same, translated.* 800 w. (In Engineering, v. 38, p. 573.)
See also paper by Weinlich.

***Williams,** Charles Wye.
Elementary treatise on the combustion of coal and the prevention of smoke, chemically and practically considered, with an appendix containing the report on the Newcastle steam coal, and the adjudication of the premium of £500. 252 p. 141 fig. 1858. Weale.
Discusses principles of combustion, draft, air supply, furnace construction, and smoke formation. Favors prevention rather than consumption or combustion of smoke.

***Williams,** Charles Wye.
On testing the efficacy of the several plans for abating the nuisances from smoke by effecting a more perfect combustion. 300 w. 1842. (In Report of the British Association for the Advancement of Science, v. 12, p. 108.)
Considers true test to consist in ascertaining the quantity of heat produced rather than the steam generated.

***Williams,** Charles Wye.
On the combustion of coal and the prevention of the generation of smoke in furnaces. 800 w. 1840. (In Report of the British Association for the Advancement of Science, v. 10, p. 199.)
Abstract. Conditions requiring attention are stated to be the amount and quality of air admitted and its diffusion, time required for this diffusion and the place at which it occurs. Smoke consumption is considered an impossible means.

***Williams,** Charles Wye.
On the management of engine furnaces, with a view to the prevention of the waste and nuisance from smoke. 4 dr. 1854. (In Minutes of Proceedings of the Institution of Civil Engineers, v. 13, p. 397-405.)
Discussion, p. 405-415.

Williams, Charles Wye.
Prize essay on the prevention of the smoke nuisance. 48 p. Ill. 1856. Weale.

The special gold medal was awarded for this essay by the Society for the Encouragement of Arts, Manufactures, and Commerce. Discusses nature and causes of smoke, various proposed methods of prevention, and defects in existing legislation (1856).

***Williams,** Charles Wye.
Remarks on the smoke question. 900 w. 1856. (In Journal of the Franklin Institute, v. 61, p. 67.)

Criticism of statements in "Mechanics' magazine." Author argues that production of smoke has no relation to insufficient boiler surface, and that the remedy for the smoke nuisance lies in proper air admission.

***Wislicenus,** H.
Über die grundlagen technischer und gesetzlicher massnahmen gegen rauchschäden. 80 p. 1908. (Sammlung von abhandlungen über abgase und rauchschäden, no. 1.)

Suppression by use of relatively smokeless fuels

***Ackermann,** A. S. E.
The distribution of producer gas as a means of alleviating the smoke nuisance. 2,000 w. 1906. (In Journal of the Royal Sanitary Institute, v. 27, p. 80-84.)

**The same.* 1906. (In Addresses, papers and discussions at Conference on Smoke Abatement, 1905, p. 36-40.)

***Anderson,** T. Scott.
Smoke and its possible destruction. 1909. (In Papers, read at the Smoke Abatement Conferences at Sheffield, March, 1909, p. 12-18.)

Consideration is given to cause of smoke and to possible substitutes for old methods of combustion.

***Atwater,** C. G.
Smokeless fuel for cities; its relation to the modern by-product coke oven. 3 ill. 1906. (In Cassier's magazine, v. 30, p. 313-321.)

***B.,** M.
Rauchverhütung in Freiburg i. Br. 600 w. 1911. (In Rauch und staub, v. 1, p. 309.)

Though an industrial city, 70% of the smoke is from domestic fires. Chief palliative measure is use of coke and gas fuel.

***Bach,** C.
Neuere dampfkesselfeuerungen zur lösung der rauchfrage. 1 folding pl. with 41 dr. 1883. (In Zeitschrift des Vereines deutscher Ingenieure, v. 27, col. 178-188.)

Describes and illustrates many types of furnaces for solid fuel, and touches briefly on gas firing.

***Beilby,** George Thomas.
[Consumption of coal and the elimination of smoke.] 4 dr. 1 ill. 1899. (In Journal of the Society of Chemical Industry, v. 18, p. 643-653.)

President's address, considering the amounts of coal consumed in the different industries, and remedies for smoky combustion, especially through the destructive distillation of coal and the use of gas as fuel.

***Beilby,** George Thomas.
Smoke abatement. 1,000 w. 1903. (In Engineering Conference. Minutes of Proceedings of the Institution of Civil Engineers, supplement to v. 154, p. 147.)
**The same.* (In Engineering, v. 75, p. 852, 874.)
**The same, condensed.* (In Engineer, London, v. 96, p. 4.)

Brief paper on development of the movement in Great Britain. Suggests a tax on consumption of smoke producing fuels.

***Blauvelt,** William Hutton.
The practical prevention of smoke in boiler firing by the use of producer gas. 2,700 w. 1894. (In Proceedings of the Engineers' Society of Western Pennsylvania, v. 10, p. 149-159.)

Discussion, p. 169-171.
Advocates gas fuel as economical and practically smokeless.

***Booth,** William Henry.
Liquid fuel and its apparatus. 308 p. 85 ill. 1911. Constable.

"Smoke production," p. 82; "Smoke and combustion," p. 108-123.

***Burning** coal dust without smoke. 700 w. Ill. 1902. (In Iron age, v. 70, Nov. 6, p. 10.)

Experimental outfit tests by C. O. Bartlett & Snow Company of Cleveland, O., using Rowe feeder system. Coal is crushed, dried to two per cent. moisture, pulverized, and the dust sprayed upwards against arch wall of the furnace. Operators claim great economy of fuel and entire absence of smoke.

***Bury,** Ernest.
Tendencies of modern coking practice. 3 dr. 1910. (In Colliery guardian, v. 100, p. 256-258.)
**The same, abstract translation.* 150 w. 1910. (In Rauch und staub, v. 1, p. 57.)

Suggests that use of coke "is the true solution of the smokeless firing problem," and states that "if soot from any fuel is formed, it is a sign of shortage of air and points to the lack of knowledge . . . of the main principles of combustion."

***Cookson,** Charles.
Coke (charred coal) as domestic fuel. 1906. (In Journal of the Royal Sanitary Institute, v. 27, p. 68-70.)
**The same.* 1906. (In Addresses, papers and discussions at Conference on Smoke Abatement, p. 24-26.)

Advocates use of coke as fuel in interests of smoke abatement and of economy.

***D'Oyle,** Linn Cyril.
How to make London smokeless. 6,000 w. 1892. (In Gentleman's magazine, v. 49, p. 21.)

Advocates gas fuel.

***Folkard,** C. W.
How best to utilize gaseous fuel and coke for domestic and industrial purposes with the view to abate the smoke nuisance in towns. 1885. (In Journal of gas lighting, v. 46, p. 153-155.)

Second prize essay.

***Francis,** C. K.
Modification of coal by low-temperature distillation. 1908. (In Illinois—State Geological Survey. Bulletin 14, p. 237-241.)

Investigates gases evolved in atmospheres of nitrogen, steam and oxygen. Considers possibility of application of results for obtaining smokeless fuel.

***Goodwin,** George A.
Suction gas plants. 1912. (In Papers read at the Smoke Abatement Conferences, March . . . 1912, p. 109-117).

Gives in detail steps in production of producer gas and summarizes its advantages as a fuel.

***Graham,** John William.
Present situation and our immediate duty. 1909. (In Papers read at the Smoke Abatement Conferences at Sheffield, March, 1909, p. 73-75.)

Summary of address.
Immediate remedy proposed is substitution of cheap gas or smokeless coal as fuel.

***Humphrys,** Norton H.
Some notes in regard to the Smoke Abatement Institution tests. 1883. (In Journal of gas lighting, v. 42, p. 402-403, 445-446.)

Discusses results of tests carried out by D. K. Clark for Smoke Abatement Committee, 1882. Relative costs of coal and gas for heating and cooking were investigated.

***Kobbert.**
Smoke abatement in Germany. 1912. (In Papers read at the Smoke Abatement Conferences, March . . . 1912, p. 118-119.)

Abstract.
Conclusion is that "gaseous fuel is without doubt, the most practicable and cheapest agent for obtaining heat without smoke at the present time."

***König.**
Beseitigung der rauchplage, besonders unter verwendung von koks für backöfen. 1 dr. 1904. (In Journal für gasbeleuchtung, v. 47, p. 405-408.)

Considers principles of combustion generally, but is especially concerned with smokeless combustion in bakeries, by use of coke as fuel.

Lancet Analytical Sanitary Commission.
Second report on perfect combustion and smoke prevention. 1892. (In Lancet, 1892, v. 1, p. 548-550.)

Lancet Special Sanitary Commission on Smoke Prevention and Perfect Combustion.
III. Gaseous fuel, gas-heating and gas-cooking appliances. 1893. (In Lancet, 1893, v. 2, p. 1326-1336.)

***Lewes,** Vivian Byam.
Carbonisation of coal; a scientific review of the formation, composition and destructive distillation of coal for gas coke and byproducts. 315 p. 27 ill. 1912. Allan.

Discusses briefly the formation of smoke and the value of smokeless fuels in maintaining purity of the atmosphere, p. 230-241.

***Lewes,** Vivian Byam.
Smoke and its prevention. 1910. (In Nature, v. 85, p. 290-294.)
**The same.* (In Journal of gas lighting, v. 112, p. 787-788.)

Lecture before the London Institution.
Discusses physical and chemical action during combustion, and method of formation of smoke. Author favors use of smokeless solid fuel, from which the smoke-forming constituents have been volatilized.

***Lish,** Joseph J.
Smoke abatement and gas as fuel. 1887. (In English mechanic and world of science, v. 45, p. 2-3.)

Condensed from paper before Society of Architects.

***Lodge,** Oliver J.
Fuel and smoke. 1886. (In Engineer, London, v. 61, p. 414-415; v. 62, p. 66-68.)

**The same.* (In Scientific American supplement, v. 23, p. 9338-9340, 9360-9361.)

Lecture before the Royal Institution.
Reviews theory of smoke production in interesting style. Advocates use of gas as fuel.

Manufacturers Club of Cincinnati.
Smoke prevention and fuel gas. 46 p. 1896.

Report of Committee on Fuel Gas and Smoke Suppression, submitted May 9, 1896.—Remarks of Mr. George F. Randolph.—Report of the Committee on Fuel Gas, submitted June 13, 1896.—Letter from the United States Coke & Gas Co.—Letter from Mr. H. L. Payne.—Addresses of Hon. Joseph D. Weeks.—Remarks of Hon. Thomas McDougall.

***Moncrieff,** W. D. Scott-.
Smokeless London. 1,000 w. 1880. (In Nature, v. 23, p. 151.)

Proposes a scheme for producing from coal a high grade of illuminating gas and a "smokeless fuel" having a heating capacity 10 per cent. greater than coke.

***Moncrieff,** W. D. Scott-.
Solid smokeless fuel. 1912. (In Papers read at the Smoke Abatement Conferences, March . . . 1912, p. 104-108.)

Advocates use of fuel remaining after extraction of only part of the gas from coal.

***Moncrieff,** W. D. Scott-.
Suggestions for preventing London smoke and making it commercially available. 7,000 w. 1881. (In Journal of the Society of Arts, v. 29, p. 167.)

See also letters, p. 241, 270.

**The same, abstract.* 300 w. 1881. (In Iron, v. 17, p. 79.)

Use of bituminous coal by present methods must be abandoned. Proposes use in half-coked state arrived at by short process of distillation. Yearly value of London smoke, which author's scheme proposes to convert into useful products, is estimated at £2,125,000 (1881).

***Paris.**
Note sur l'emploi du coke dans les usines du service des eaux, d'octobre 1910 à octobre 1911. 2 p. 1911.

Typewritten copy.

***Parr,** S. W. & **Olin,** H. L.
Coking of coal at low temperatures. 46 p. 5 dr. 10 ill. 1912. (University of Illinois—Engineering Experiment Station. Bulletin 60.)

**The same, condensed.* (In Engineering news, v. 68, p. 1192-1194.)

Resulting coke product is considered to be smokeless if properly burned.

***Porter,** W. E.
Burning of powdered coal. 1913. (In Industrial world, v. 92, n. s. v. 47, pt. 1, p. 146-147.)

Pulverized fuel as a factor in smoke reduction. Traces historical development briefly.

***Pütsch,** Albert.
Gas and coal dust firing; a critical review of the various appliances patented in Germany for this purpose since 1885; tr. by Charles Salter. 124 p. Ill. 1901.

While not dealing directly with smoke prevention, gives much information as to the value of different systems in securing perfect combustion.

***Reischle.**
[Schornsteinrauch vom standpunkte der technik und der allgemeinen wohles.] 250 w. 1897. (In Zeitschrift des Vereines deutscher Ingenieure, v. 41, pt. 1, p. 229.)

Brief abstract of address before Bayerischer Bezirksverein. Deals largely with smokeless substitutes for soft coal.

***Riddell, H.**
Gas and smoke. 1911. (In Journal of gas lighting, v. 115, p. 294-295.)

Discusses relative merits of gas and coal for domestic heating, considering production of smoke and economy.

***Riddell, H.**
Gas and the smoke nuisance. 1911. (In Transactions of the Royal Sanitary Institute, v. 32, p. 568-572.)

Abstract. Gas is considered very efficient and satisfactory domestic fuel, and examples of favoring conditions are included.

***Die russplage** in den städten und die häuslichen feuerungsstätten. 1900. (In Journal für gasbeleuchtung, v. 43, p. 29-31.)

Advocates use of coke and gas as fuels.

***Siemens,** C. William.
Dr. Siemens's new cure for smoke. 1,400 w. Ill. 1880. (In Nature, v. 23, p. 25.)

See also p. 91, 360.

**The same, abstract.* 300 w. 1880. (In Iron, v. 16, p. 365.)

Author holds "that it is almost barbarous to use raw coal for any purpose and that the time will come when all our fuel will be separated into its two constituents [gas and coke] before reaching our factories or our domestic hearths."

Illustrates author's fireplace for burning both gas and coke or anthracite.

***Smith,** W. B.
Smokeless fuel. 1910. (In Journal of gas lighting, v. 110, p. 103-104.)

Paper before meeting of Scottish Gas Managers.

Claims gas to be an ideal fuel, cheaper for cooking and heating for short periods, and only about 25% dearer for prolonged heating.

Smoke. 1898. (In Progressive age, v. 16, p. 431-432.)

Editorial, extolling virtues of gas as a fuel.

***Smoke** abatement and "coalite." 1907. (In Journal of gas lighting, v. 98, p. 293.)

"Coalite" shown to be not very unlike gas coke.

***Smoke** and fog. 800 w. 1891. (In Engineer, London, v. 71, p. 187.)

Editorial, considering advisability of substituting gas for coal as fuel.

***Smoke** nuisance. 1,500 w. 1857. (In Chambers's journal, v. 27, p. 46.)

Proposes that the use of gas, coke and anthracite be made compulsory in London.

***Smoke** problem. 1894. (In Chambers's journal, v. 71, p. 177-179.)

Believes true solution will come with substitution of gas for coal as domestic fuel.

***Somerville, J.**
How best to utilize gaseous fuel and coke for domestic and industrial purposes with the view to abate the smoke nuisance in towns. 5 dr. 1885. (In Journal of gas lighting, v. 46, p. 149-153.)

Prize essay.

***Swinburne,** James.
Smoke. 1908. (In Journal of gas lighting, v. 104, p. 193-194.)

Review of inaugural address before Association of Engineers-in-charge at St. Bride's Institute, London. Considers steps in smoke production. Advocates gas heating for domestic use.

***Thwaite,** B. H.
London smoke and fog plague. 1 dr. 1892. (In Industries, v. 12, p. 91, 115-116.)

Summarizes knowledge of formation and composition of smoke fogs. Favors conversion of solid to gaseous fuel. Cites Pittsburgh as an instance where adoption of gaseous fuel caused a great lessening in the amount of smoke formed.
See also editorial, p. 110.

***Thwaite,** B. H.
London smoke and fog plague: its origin and dangers, and a proposed solution for its remedy. 1891. (In Industries, v. 10, p. 41-42, 66-68.)

Discusses prevalence of London fogs and proposes substitution of gas for coal fuel.

***United Coke and Gas Company, New York.**
Short treatise on the destructive distillation of bituminous coal with reference to the United-Otto system of by-product coke ovens. 146 p. 65 ill. 1906.

Mentions nuisance of smoke and soot from bee-hive ovens and its absence in case of by-product oven. No technical data on smoke.

***Whimster,** J.
How best to utilize gaseous fuel and coke for domestic and industrial purposes with the view to abate the smoke nuisance in towns. 2 dr. 1885. (In Journal of gas lighting, v. 46, p. 155-158.)

Supplementary prize essay.

Installation of central plants for various purposes

***Atkinson,** A. S.
Smokeless cities of the future. 1,200 w. Ill. 1907. (In Technical world, v. 7, p. 351.)

Illustrates the evils of smoke, and comments favorably on the scheme announced by English engineers to convert all coal into gas at the mouth of the mine, and transmit all fuel by pipe to our greater cities.

***Beaufsichtigung** der fiskalischen feuerstätten behufs rauchverminderung. 1908. (In Journal für gasbeleuchtung, v. 51, p. 185-186.)

Based on communication of Prussian Ministry regarding operation and control of municipal heating plants, for prevention of smoke and saving of fuel.

***Booth,** William Henry.
Smoke abolition. 1,300 w. 1902. (In American machinist, v. 25, pt. 2, p. 1169.)

Letter in reply to paper of Mr. Tecumseh Swift (v. 25, pt. 1, p. 914.)

***Carnegie,** Andrew.
The smoke nuisance. 1899. (In Year book and directory of the Chamber of Commerce of Pittsburgh, Pa., 1899, p. 95-98.)

Part of an address at annual banquet of the Chamber of Commerce. Discusses smoke nuisance and suggests use of artificial gas rather than burning of raw coal.

*[**Fichtl, & Lemberg.**]
Zentrale rauchgasbeseitigung. 1911. (In Rauch und staub, v. 1, p. 357-360.)

Abstract of article in "Gesundheits-ingenieur," 3 June, 1911.
Advocates smoke washing in a central plant to which all waste gases shall be pumped for treatment.

***Hüttig.**
Zentrale wärmeversorgung. 1912. (In Rauch und staub, v. 2, p. 343-347.)

Brief reference to effect on smoke abatement.

***Martin,** Arthur J.
Smoke prevention and coal conservation. 8,000 w. 1906. (In Journal of the Royal Sanitary Institute, v. 27, p. 85.)

**The same*. 1906. (In Addresses, papers and discussions at the Conference on Smoke Abatement, p. 41-58.)

**The same, condensed.* (In Engineering magazine, v. 30, p. 895-897.)

Considers consumption of various fuels. Recommends the burning of all coal at the mines, and transmission of power. Compares electric transmission, compressed air and gas transmission, advocating the latter and discussing it with reference to a pipe line to supply all fuel used in London.

***Meter,** Eduard.
Zentralheizung als mittel zur erschränkung der rauchplage. 1912. (In Rauch und staub, v. 3, p. 16-18.)

**The same, abstract.* 250 w. 1912. (In Rauch und staub, v. 2, p. 302.)

Address before "Oesterreichische Gesellschaft zur Bekämpfung der Rauch- und Staubplage," 2 May, 1912.

***Shaw,** W. N.
The treatment of smoke; a sanitary parallel. 7,200 w. 1902. (In Journal of the Sanitary Institute, v. 23, p. 318.)

**The same, condensed.* (In Nature, v. 66, p. 667-670.)

**The same, condensed.* (In Architect and contract reporter, v. 68, p. 166-167, 189-190.)

Compares the purification of air and of sewage, contrasting laxity in treatment of the smoke nuisance with progress in sewage disposal. Does not describe apparatus for smoke prevention, but advances the plan of having smoke drawn from the factory and domestic chimneys through closed conduits to a central station for treatment.

***Smoke** question. 1909. (In Electrical review and western electrician, v. 55, p. 771-772.)

Editorial, favoring centralization of power distribution and abolition of isolated plants.

***Spence,** Peter.
Smoke and fog. 1881. (In Chemical news, v. 43, p. 142-143.)

Letter, proposing gathering of London smoke in one huge chimney, of perhaps 700 ft. diameter and 600-1000 ft. in height.

***Swift,** Tecumseh.
Abolition of smoke. 1,000 w. 1902. (In American machinist, v. 25, pt. 1, p. 914.)

Ridicules the idea of smokeless combustion in industry and favors the erection of large central plants remote from cities either for gas production or generation of electricity. See also letter by Booth, (v. 25, pt. 2, p. 1169.)

***Zentralanlagen** zur beseitigung des rauches. 1911. (In Prometheus, v. 23, p. 134-135.)

Author believes in feasibility of plan for conveying all smoke from residence and factory chimneys by underground passages to central purifying plant.

Substitution of alternative forms of power

***[Allen,** Henry E.]

Electric lighting and the smoke problem. 1889. (In Electrical world, v. 14, p. 343-344.)

Proposes central electric power plant to supersede stationary engines with high pressure water supply.

***Anti-smoke** movement as a factor in power engineering. 1,100 w. 1913. (In Industrial world, v. 93, n. s. v. 47, pt. 1, p. 150.)

Editorial on necessity for fuel conservation and for smokeless utilisation of bituminous coal if this fuel is to hold the field against hydro-electric and other forms of power.

***Elektrische** einrichtungen für bäckereien. 250 w. 1912. (In Rauch und staub, v. 2, p. 360-361.)

Abstract from "Elektrische kraftbetriebe und bahnen," 1912, no. 23, p. 498-500.

***Estcourt,** Charles.

Why the air of Manchester is so impure. 39-51 p. 1887. (Manchester and Salford Noxious Vapours Abatement Association. Lectures on air pollution, no. 4.)

Extent of air pollution by coal smoke in Manchester, and proposal for abatement by partial substitution of compressed air or water power.

***Fedden,** S. E.

Elimination of smoke by the distribution of electrical energy. 1909. (In Papers read at the Smoke Abatement Conferences at Sheffield, March, 1909, p. 42-47.)

Favors wider use of electric power from central stations as a means of conserving coal and diminishing smoke.

***Ferranti,** S. Z. de.

Coal conservation, home grown food and the better utilisation of our labour. 1910. (In Journal of the Institution of Electrical Engineers, v. 46, p. 6-19.)

**The same.* 1910. (In Engineering, v. 90, p. 712-714.)

Believes "that these problems are closely connected and are all capable in a great measure of being solved by means of an electrical treatment." Claims that in England now (1910) only one per cent. of the coal burned is used by the public electricity supply works of which statistics are published, but that with general "conversion of coal to electricity" fuel conservation and smoke abatement will be effected.

***Fodor,** Etienne de.

Die rauchplage und die industrie. 1907. (In Elektrotechnik und maschinenbau, v. 25, p. 171-176, 197-203.)

Takes up appliances and firing methods for preventing smoke. Considers gas and oil engines, steam and gas turbines and electric motors as factors in smoke prevention.

***Kayser,** Ottomar.

Welche kraftquellen stehen unseren nachkommen zu gebote, wenn die kohlenlager erschöpft sein werden? 1911. (In Rauch und staub, v. 1, p. 201-202.)

Abstract from "Zentralblatt der bauverwaltung," 28 Jan., 1911, p. 61-64.

Considers the various sources of power, dealing in part with waste due to smoke and its bearing on exhaustion of fuel supply .

***Körting,** Joh.
Verbrennungskraftmaschinen und die rauchbelästigung der städte. 4,000 w. 2 diag. 1899. (In Zeitschrift des Vereines deutscher Ingenieure, v. 43, p. 197-202.)

Advocates the general adoption of internal combustion engines as an important aid to smoke prevention.

***Martin,** Arthur J.
Coal conservation, power transmission and smoke prevention. 2 diag. 3 dr. 1906. (In Journal of the Society of Arts, v. 54, p. 531-552.)

**The same, condensed.* (In Journal of gas lighting, v. 94, p. 26-30.)

Advocates conservation at all stages in the treatment and utilization of coal and the products and by-products obtained from it. Discusses substitutes for direct use of coal, and alternative sources of power.

See also paper by Smith, C. Alfred.

***Popplewell,** W. C.
A smokeless London; the promises of gaseous fuel and electricity. 1902. (In Cassier's magazine, v. 21, p. 206-212.)

Indicates causes of heavy fogs and possibilities of improvement.

***Smith,** C. Alfred.
Electricity and gas v. smoke. 1906. (In Electrical review, London, v. 58, p. 835-836.)

Discusses figures and suggestions in Martin's lecture before Society of Arts.

Mechanical prevention

General. Design and operation of furnaces for bituminous coal

***Ackroyd-Willoughby** smoke preventer and fuel economiser. 1,000 w. Ill. 1891. (In Engineer, London, v. 71, p. 395.)

"Trials show that with the apparatus in use the evaporative efficiency of the boiler is increased 20.5 per cent., and the amount of smoke greatly reduced."

***Bach,** [C.]
[Ausstellung von zeichnungen für dampfkesselfeuerungsanlagen mit den verschiedenartigen vorkehrungen zur rauchverzehrung.] 1897. (In Zeitschrift des Vereines deutscher Ingenieure, v. 41, p. 516-517.)

Arranges devices and methods in 20 classes with a few sub-classes.

***Barwise,** Sidney.
Abatement of the smoke nuisance. 1890. (In British medical journal, v. 68, p. 499-501.)

Reviews types of mechanical devices that are available for use, with reference also to requirements of the Public Health Act.

***Bement,** Alburto.
The economical burning of coal without smoke, with especial reference to the use of washed coal. 48 p. Ill. 1904.

Binder's title reads "A clean chimney."

"Matter is presented in such manner as to be useful to the fireman, engineer and proprietor, so far as the limits imposed by a single volume will allow." Preface.

***Bement,** Alburto.
The Peabody atlas; shipping mines and coal railroads in the central commercial district of the United States accompanied by chemical, geological and engineering data. 149 p. Ill. 1906.

Chapter on smokeless furnaces and smoke suppression (p. 137). Describes and illustrates many successful installations.

***Bement**, Alburto.
Smoke suppression. 1908. (In Illinois—State Geological Survey. Bulletin 14, p. 338-339.)

Lecture before Illinois Fuel Conference.

Brief discussion of subject, emphasizing necessity of uniform and automatic feeding of coal, and of combustion chamber of sufficient size.

***Bement**, Alburto.
Smokeless combustion of bituminous coal. 1 dr. 1 ill. 1908. (In Illinois—State Geological Survey. Bulletin 14, p. 229-232.)

Demands the uniform evolution of gases from coal, and their admission to a fire-brick chamber so constructed as to allow of complete combustion.

***Bement**, Alburto.
Smokeless furnaces and smoke suppression. 11 dr. 1907. (In Engineer, Chicago, v. 44, p. 350-353.)

Conditions for perfect combustion and methods of burning fuel.

***Bement**, Alburto.
Some results due to improvement in boiler and furnace design. 5 diag. 13 dr. 1907. (In Journal of the Western Society of Engineers, v. 13, p. 209-282.)

Gives comparative trials of two water-tube boilers, showing the improvement due to use of a tile roof above the furnace.

***Bement**, Alburto.
Suppression of smoke with particular reference to steam boilers. 7,000 w. Dr. 1906. (In Journal of the Western Society of Engineers, v. 11, p. 693.)

Directs attention to the engineering phase, emphasizing certain fundamental principles. Lengthy discussion with drawings of many furnaces and stokers.

***Benjamin**, Charles H.
Economy in combustion and smoke prevention from a mechanical standpoint. 1896. (In Journal of the Association of Engineering Societies, v. 16, p. 164-171.)

**The same.* (In Canadian engineer, v. 4, p. 129-130.)

Briefly gives characteristics of different devices.

***Blacher**, C.
Brennstoff und feuerung; ein beitrag zur rauchfrage. 1911. (In Rauch und staub, v. 1, p. 109-117.)

Considers composition and properties of various coals, and discusses smokeless firing.

Blanchard, Albert.
Complete combustion as a prevention of smoke. 1892. (In Stationary engineer, v. 11, p. 234-235.)

Discusses "an invention called the complete combustion boiler," giving arguments for its adoption.

***Booth**, William Henry.
Smoky furnaces and how to avoid them. 10 dr. 1901. (In Electrical review, London, v. 49, p. 167-169, 177-179, 256-258, 377-378.)

Takes up design of a few types of furnace, showing how they promote or fail to promote smokeless combustion.

***Burgdorf**, E.
Vollkommene verbrennung und rauchverzehrung. 600 w. 1891. (In Zeitschrift des Vereines deutscher Ingenieure, v. 35, pt. 2, p. 941.)

Abstract of address before Hamburger Bezirksverein. Brief comment on various types of furnaces, both with stationary and movable grates.

***Chamberlain,** Paul M.

Boiler room economy. Perfect combustion, losses and the stoker as a smoke abater. 6 diag. 3 ill. 1907. (In Engineer, U. S., v. 44, p. 726-728.)

Abstract of lecture before International Association for the Prevention of Smoke, at Milwaukee, Wis.

***Clark,** Daniel Kinnear.

Steam engine; treatise on steam engines and boilers. 4 v. 1891.

Chapters 17-19 of v. 1, sec. 1, deal with contrivances for the prevention of smoke in the furnaces of steam boilers. v. 1, p. 150-206, fig. 30-71. Bibliographic foot-notes.

***Consummation** of smoke-burning. 2,500 w. 1858. (In Chambers's journal, v. 29, p. 234.)

Account of competitive selection of apparatus for smokeless firing of a certain boiler. Of 103 devices submitted four were tested and are here described. The successful type—the Williams furnace—is arranged for alternate side firing, and admits air by means of jets.

***Difficulty** of burning soft coal smokelessly. 1906. (In Power, v. 26, p. 119.)

Shows difficulty of supplying air in sufficient quantities.

Doepp, G. v.

Ueber rauchlose verbrennung in dampfkesselfeuerungen. 135 p. 39 pl. 1895. St. Petersburg.

**The same, abstract and review.* 1895. (In Zeitschrift des Vereines deutscher Ingenieure, v. 39, pt. 2, p. 1387-1388.)

***Donkin,** Bryan.

The heat efficiency of steam boilers; land, marine and locomotive, with tests and experiments on different types, heating value of fuels, analyses of gases, evaporation, and suggestions for testing boilers. 311 p. Ill. 1898.

Has a chapter on smoke prevention and a good deal of information on furnaces and mechanical stokers.

***Dosch,** A.

Rauchvermeidung durch zuführung von luft über dem feuer. 2,400 w. Ill. 1904. (In Zeitschrift des Oesterreichischen Ingenieur- und Architekten-Vereines, v. 56, pt. 1, p. 9.)

***Engert,** A. C.

Prevention of smoke. 7,000 w. 4 dr. 1881. (In Transactions of the Society of Engineers, v. 21, p. 101-112.)

Discussion, p. 112-120.

**The same, abstract.* 500 w. 1881. (In Architect, v. 25, p. 414-415.)

Presentation of the case for "prevention" rather than "consumption" of smoke. Describes and illustrates author's furnace equipped with a double door designed to prevent admission of cold air to fire-box. Advocates application to domestic fires and to locomotives.

***Foster,** Ernest H.

Practical way of building smokeless furnaces. 2 dr. 1906. (In Journal of the Society of Chemical Industry, v. 25, pt. 1, p. 404-405.)

Describes Kent's "wing wall furnace."

***Gall's** smoke preventer. 800 w. 1866. (In Engineering, v. 2, p. 307.)

Automatic regulation of air at bridge, air admission valve being operated by flow of water from one vessel to another.

***Gebhardt,** G. F.

Smoke prevention, furnaces, stokers. 41 dr. 1910. (In his "Steam power plant engineering," ed. 3, p. 124-151.)

***Gebhardt,** G. F.—*continued.*

Describes and illustrates types of mechanical stokers and smokeless furnaces.

***Haage.**

Neue mitteilungen über rauchverhütung. 300 w. 1890. (In Zeitschrift des Vereines deutscher Ingenieure, v. 34, pt. 2, p. 959.)

Abstract. Deals with firing systems of Donneley, Cario and Leach.

Haier, F.

Dampfkessel-feuerungen zur erzielung einer möglichst rauchfreien verbrennung. 142 p. 301 ill. 22 pl. 1899. Springer.

**The same, review.* 1899. (In Zeitschrift des Vereines deutscher Ingenieure, v. 43, pt. 1, p. 242.)

***Haier, F.**

Dampfkessel-feuerungen zur erzielung einer möglichst rauchfreien verbrennung, im auftrage des Vereines deutscher Ingenieure bearbeitet vom Verein für Feuerungsbetrieb und Rauchbekämpfung in Hamburg. ed. 2. 320 p. Ill. 1910.

**The same, review and abstract.* 1910. (In Rauch und staub, v. 1, p. 37-40.)

Exhaustive study of smoke prevention in so far as it may be effected by proper operation of boilers and furnaces.

***Haier, F.**

Feuerungsuntersuchungen des Vereins für Feuerungsbetrieb und Rauchbekämpfung in Hamburg. 92 p. Ill. 1906. Springer.

**The same, review.* 1906. (In Zeitschrift des Vereines deutscher Ingenieure, v. 50, pt. 1, p. 1416.)

Report on tests of appliances. Includes a large number of folding plates, giving tables and data. Gives in full detail the record of some very thorough tests of methods of firing. The points under consideration were the efficiency of present (1906) methods of smoke prevention and their influence on fuel consumption. The relation between smoke production and fuel consumption is also discussed.

Häntzschel, W.

Rauchlose und rauchverbrennende feuerungen. 4 diag. 3 ill. 1899. (In Gesundheits-ingenieur, v. 22, p. 241-246.)

Discusses economy of coal-dust, and flat-grate firing.

***Hawley** down-draft smokeless furnace. 600 w. Ill. 1892. (In Engineering news, v. 27, p. 98.)

Claims that smoke is almost entirely prevented.

***Hawley** smokeless furnace. 800 w. 1891. (In Iron age, v. 48, p. 876.)

Inexpensive furnace on down-draft principle.

***Hill,** John W.

Steam boiler furnaces for smoke prevention. 3,500 w. 1880. (In Van Nostrand's eclectic engineering magazine, v. 22, p. 62.)

The Board of Commissioners of the Cincinnati Industrial Exposition (1879) offered a prize of $500 for the best furnace system for steam boiler use designed to burn bituminous coal without smoke. This paper reports the trials of the five competing types.

***Hodgkin,** John E.

On Prideaux's self-closing valve for preventing smoke in steam-boiler and other furnaces. 2,100 w. 1854. (In Proceedings of the Institution of Mechanical Engineers, v. 5, p. 111.)

Automatic air supply valve "which regulates the admission continuously in a diminishing rate, according to the quantity required by the state of the fuel."

***Hoyle's** smoke-preventing apparatus. 600 w. 1893. (In Iron, v. 41, p. 137.)

Based on automatic regulation of air supply.

Hoyt, Joseph B.

J. B. Hoyt's furnace for the combustion of bituminous coal and the prevention of smoke. Patented February 8, 1870. 39 p. 4 pl. 1876. New York, "Shoe and leather reporter" press.

"The furnace is an oven of fire-brick . . . The walls and [slightly arched] crown are hollow. The grate . . . is inclined . . . to the center to facilitate feeding . . . The coal is fed into the furnace through six openings (three on each side of the furnace) these openings being funnel shaped, the small end toward the fire. The coal is kept piled up on shelves outside of the feed holes and pushed through the feed holes into the furnace with a wooden or iron bar, as often as the fires burn down." Air is admitted both above and below the fire, the supply being controlled by iron shutters.

***Hughes** automatic smoke preventer. 3 dr. 1905. (In Iron age, v. 76, p. 1226-1227.)

Describes device in which air is automatically admitted into fire-box just after green fuel has been fed to fire.

***Huyette,** Miles Clayton.

Automatic smokeless furnace: cost for power and smoke repression. 1910. (In Industrial world, v. 87, n. s. v. 44, p. 1394-1395.)

Paper before the Ohio Society of Mechanical, Electrical and Steam Engineers.
Briefly argues that smoke is in large part unnecessary and uneconomical.

***International Correspondence Schools, Scranton, Pa.**

Combustion, firing and draft. 25 p. 7 dr. 1902. (In International library of technology, v. 7, section 15.)

Considers principles of combustion, fuels, and methods and conditions of proper firing.

***Johnson,** William B.

Description of an apparatus for the prevention of smoke in steam boiler and other furnaces. 1,800 w. Ill. 1857. (In Proceedings of the Institution of Mechanical Engineers, v. 8, p. 125.)

Air is admitted downward directly over furnace bridge and the supply automatically regulated. Said to prevent smoke.

***Jones,** Charles E.

Steam heating. 2,000 w. Dr. 1888. (In Journal of the Association of Engineering Societies, v. 7, p. 14.)

Describes system of Washington University, St. Louis. Gives (p. 18) experience with smokeless furnaces, all those tried having proved unsatisfactory as regards economy.

***Kausch,** Oskar.

Die in den jahren 1907 bis 1911 in Deutschland erteilten und zurzeit noch zu recht bestehenden patente betr. verfahren und vorrichtungen zur bekämpfung des rauches und russes bei stationären und fahrbaren feuerungen. 33 dr. 1913. (In Rauch und staub, v. 3, p. 119-122, 139-149.)

***Kent,** William.

Steam boiler economy. 458 p. 1901.

Brief consideration of smoke prevention. See index.

Kneeland, Samuel.

On economy of fuel, and the consumption of smoke, as effected by "Amory's improved patent furnace," with an investigation of the principles involved. 39 p. 1866. Boston. J. E. Farwell & Co.

***Kraft.**
Rauchfreie verstellbare schrägfeuerung. 2 ill. 1899. (In Zeitschrift des Vereines deutscher Ingenieure, v. 43, pt. 1, p. 521-523.)

Address before Dresdener Bezirksverein.

Discusses proper conditions for combustion, and describes author's inclined grate furnace.

Lee Smokeless Combustion Company.
Complete smokeless combustion. Catalogue No. 1. 32 p. Ill. 1909.

Description and testimonials.

***McClure, C. H.**
Principles of furnace design for smokeless combustion. 1908. (In Engineering record, v. 58, p. 521-523.)

**The same.* (In Boiler maker, v. 9, p. 121-123.)

Paper before Chicago section of American Chemical Society.

Shows smokeless design to be entirely feasible and economical, and dependent on the following principles: uniform supply of fuel, properly distributed air supply, capacity to develop high temperatures, and retention of burning gases within high temperature zone till combustion is completed.

***McDakin, J. Gordon.**
On economy of fuel and prevention of smoke. 1,000 w. 1872. (In Journal of the Society of Arts, v. 20, p. 400.)

"In each tube of an ordinary tubular boiler is inserted another of much smaller diameter perforated at its end nearest the fire in such a manner as to cause an induced draught."

***Marsh, T. A.**
Design of breechings and smoke flues. 4 ill. 1912. (In Engineering digest, v. 12, p. 190.)

Discusses principles of design, claiming that in many cases where boilers and furnaces are condemned for bad performance the trouble lies entirely in faulty design of breeching.

***Martin, Frank.**
Firebrick walls prevent smoke. 400 w. 2 dr. 1912. (In Power, v. 36, p. 162.)

Smoke production was diminished by addition of increased hot surface, with checker work.

***Mazey, J. T.**
Smoke prevention. 100 w. 1898. (In Industries and iron, v. 25, p. 390.)

Brief abstract of paper before Birmingham Association of Mechanical Engineers.

Stated that "the more hot gases could be carried into the flue the less smoke would be emitted."

***Moore, Robert.**
Smoke prevention. 4,800 w. 1889. (In Journal of the Association of Engineering Societies, v. 22, p. 194.)

Considers causes of smoke and claims that relief must be sought both in the mechanical stoker and the proper admission of air.

***Nansouty, Max de.**
La fumivorité en Angleterre. 4 dr. 1894. (In La Nature, v 43, p. 43-46.)

Describes and illustrates mechanical devices of Bennis, Vicars, Proctor and Howatson for preventing smoke.

New forced draught smoke-consuming furnace. 2 ill. 1906. (In Page's weekly, v. 8, p. 230-231.)

Horsfall Company's design. Smoke consuming arrangement "consists of a separate blower or air injector over the grate, which draws its

New forced draught smoke-consuming furnace—*continued.*

air supply through the hollow cast iron baffle fixed behind the firing front." A regulated supply of heated air is thus delivered to the midst of the heated gases. "Applicable to every class of boiler, and specially adapted for burning small and dirty coals."

***Nicholson,** William.
Practical smoke prevention. 151 p. Ill. 1902.

Small practical handbook of mechanical smoke prevention. Intended primarily for boiler and furnace firemen. Chemistry and theory have been omitted.

*[**Norris,** E. B. *comp.*]
Smokeless combustion of coal. Ill. 1912. (In E. M. Shealy's "Steam boilers," ed. 1, chapter 12, p. 179-194.)

Discussion hand-fired furnaces and mechanical stokers.

***Parker,** T. T.
Smokeless soft coal furnace. 1 dr. 1910. (In Power and the engineer, v. 32, pt. 1, p. 737-738.)

Describes furnace with special fire brick arches.

***Parsons,** H. de B.
Steam boilers, their theory and design. 375 p. 1903.

Smoke prevention, p. 14, 336.

***Peabody,** Cecil H. & **Miller,** Edward F.
Fuels and combustion. 1 dr. 1908. (In their "Steam boilers," ed. 2, p. 47-74.)

***Pittsburgher's** device: a gas producer under the boiler. 1 diag. 1913. (In Industrial world, v. 92, n. s. v. 47, pt. 1, p. 144-145.)

W. C. McClurg's patented process for complete combustion. Apparatus abolishes grate-bars, and provides pre-heater for feed water. Diagram shows results of tests.

Pradel, A.
Elektrizität im dienste der rauchverzehrung. 4 ill. 1906. (In Elektrotechnischer anzeiger, v. 23, p. 189-191.)

Several devices for electrical control of air admission, etc.

***Randall,** D. T.
Burning of coal without smoke. 800 w. 1908. (In Scientific American supplement, v. 65, p. 181.)

"Abstract from a bulletin (unidentified) of the United States Geological Survey."
General statement dealing with fuel waste, and brief discussion of advantages of gas-producer.

***Randall,** D. T.
Problem of smoke abatement. 1910. (In Power and the engineer, v. 32, pt. 2, p. 2037-2041.)

Specially designed furnaces and skilful firing are given as the only solutions of the prevention of smoke from bituminous coal of high volatile content. Automatic stokers are recommended.

***Randall,** D. T.
Production of smoke with suggestions as to its prevention. 1908. (In Scientific American supplement, v. 65, p. 283.)

"Abstract from a bulletin (334) issued by the United States Geological Survey." (U. S. Bureau of Mines Bulletin 39.)
Popular presentation of principles of combustion, and enumeration of chief causes of smoke.

*[**Rauchbelästigung** durch fabrikschornsteine.] 1885. (In Zeitschrift des Vereines deutscher Ingenieure, v. 29, pt. 1, p. 493-495.)

General discussion before Bergischer Bezirksverein. Special attention to Wilmsmann furnace.

***[Rauchverhütungsvorrichtung** der firma Schulz-Knaudt.] 1 diag. 2 dr. 1901. (In Zeitschrift des Vereines deutscher Ingenieure, v. 45, pt. 2, p. 1652-1653.)

Secondary air is pre-heated and mixed with the heated gases. Smoke diagram shows graphically the results obtained in smoke prevention during tests.

***Rauchverzehrende** dampfkesselfeuerung von Dulac. 600 w. 1893. (In Zeitschrift des Vereines deutscher Ingenieure, v. 37, pt. 2, p. 1612.)

***Rauchverzehrende** feuerung von Schulz-Knaudt, Aktiengesellschaft in Essen. 1 folding pl. 1892. (In Zeitschrift des Vereines deutscher Ingenieure, v. 36, pt. 1, p. 76-77.)

Mentions a number of other devices giving foot-note references to descriptive articles.

***[Rauchverzehrende** feuerungen.] 1857. (In Zeitschrift des Vereines deutscher Ingenieure, v. 1, p. 284.)

General discussion at meeting of Niederrheinischer Bezirksverein.

***Rossell's** smoke preventer. 500 w. Ill. 1899. (In Engineer, London, v. 88, p. 48.)

**The same.* (In Scientific American supplement, v. 48, p. 19811.)

British apparatus designed to admit a supply of air above the fires immediately after the application of fresh coal.

***Schinz, C.**

Rauchverzehrende feuerung mit künstlichem luftzug von J. Guerin in Gravelle bei Havre. 5 dr. 1867. (In Dingler's polytechnisches journal, v. 186, p. 388-392.)

**The same, abstract.* 1868. (In Zeitschrift des Vereines deutscher Ingenieure, v. 12, col. 325.)

Smokeless combustion ascribed to the fact that fuel is fed from below.

***Schlüter.**

[Rauchverzehrende feuerung der Sparfeuerungs-Gesellschaft.] 250 w. 1902. (In Zeitschrift des Vereines deutscher Ingenieure, v. 46, pt. 1, p. 395.)

Brief abstract of address before Niederrheinischer Bezirksverein.

***Sicard, W. F.**

Smoke-preventing appliances. 3,500 w. Ill. 1894. (In Journal of the Franklin Institute, v. 138, p. 58.)

Nature and formation of smoke and some of the devices proposed for prevention.

***Smoke** annihilator. 1 dr. 1891. (In Scientific American supplement, v. 32, p. 13150.)

From "Chemical trade journal."

Main object of device described is to furnish a secondary supply of heated air, introduced at the back of the fire bridge.

***Smoke** consumption and economy of fuel. 1,000 w. 1899. (In (American architect, v. 65, p. 36.)

Process of Paul Cornelius patented in Germany and in the United States. Consists in distributing heated and slightly compressed air through hollow grate bars to the whole lower surface of the burning fuel.

***Smoke-preventing** apparatus. 800 w. 4 dr. 1881. (In Iron, v. 17, p. 39.)

**The same, abstract translation.* 70 w. 1881. (In Zeitschrift des Vereines deutscher Ingenieure, v. 26, col. 384.)

A. C. Engert's application of continuous firing to hand-fired domestic

***Smoke-preventing** apparatus—*continued.*

or steam-boiler furnaces. Coal is fed at back of furnace on movable plate which is pushed forward at intervals, thus replenishing fire by coal which has been slowly heated.

***Smoke** preventing apparatus. 800 w. 1 dr. 1890. (In Iron, v. 36, p. 269, 271.)

Greaves apparatus. Gives results of tests.

***Smoke-preventing** furnace door. 600 w. 4 dr. 1899. (In Engineer, London, v. 87, p. 297.)

Furnace designed by James Lethem, with specially constructed door, so that air must travel over large heating surface before reaching the fire.

***Smoke** prevention. 1,200 w. 1873. (In Van Nostrand's eclectic engineering magazine, v. 8, p. 209.)

Review of paper by Prideaux in Journal of the Royal United Service Institute. Describes author's invention for controlling air admission to furnaces.

***Smoke** prevention. 700 w. 1880. (In Iron, v. 16, p. 362.)

Invention of A. C. Engert. "Principle of the invention . . . is the division of the furnace into two parts. The coals being fed into the front part upon a thin stratum of live fuel, the gases directly rising from them are drawn into the other part of the furnace and consumed so that no smoke can be formed."

***Smoke** prevention. 1908. (In Boiler maker, v. 8, p. 325-326.)

Design of furnace and proper methods of firing.

***Smoke** prevention and smokeless furnaces. 7,000 w. Ill. 1896. (In Engineering news, v. 35, p. 4.)

Non-technical treatment with illustrations of the principal types of furnaces.

Smoke prevention in Paris. 1898. (In Sanitary record, v. 22, p. 483-484.)

Discusses results of technical commission's investigation in Paris. The commission conducted a competitive test of 110 forms of smoke-preventing apparatus, classified in eight divisions.

***Smokeless** combustion of bituminous coal. 1902. (In Engineering magazine, v. 24, p. 445.)

Discusses scientific construction of furnaces and boilers and correct conditions of combustion, as outlined in recent papers on the subject.

***Smokeless** combustion of low-grade fuels; the Cowper-Coles "caloriser." 1 dr. 1910. (In Colliery guardian, v. 99, p. 808-809.)

***Smokeless** furnace. 250 w. 1867. (In English mechanic and mirror of science and art, v. 5, p. 265.)

Brief description of device manufactured by Fuel-Saving Furnace Company of New York.

***Snyder,** W. E.

Mechanical devices as applied to firing steam boilers. 1899. (In Proceedings of the Engineers' Society of Western Pennsylvania, v. 15, p. 333-360.)

Deals briefly with smoke problem and loss due to smoke. Favors under-feed stoker with forced draft. See also his later views in discussion of paper by Sims (In Proceedings of the Engineers' Society of Western Pennsylvania, v. 27, p. 472-483.)

***Stocker.**

[Feuerungseinrichtungen zur verminderung des rauches im württembergischen staatsbetrieb.] 300 w. 1898. (In Zeitschrift des Vereines deutscher Ingenieure, v. 42, pt. 1, p. 420.)

***Stribeck, R.**
Prüfung von einrichtungen und feuerungen zur rauchverminderung bei dampfkesseln. 10,000 w. Ill. 1895. (In Zeitschrift des Vereines deutscher Ingenieure, v. 39, p. 184, 215, 509.)

Describes experiments with many different devices.

***Suppression** of smoke nuisance. 3 ill. 1907. (In Municipal journal and engineer, v. 22, p. 523-525.)

Gives principles of combustion and details of firing arrangements of furnace and stoker.

***System** for preventing smoke. 7 diag. 1903. (In Engineer, U. S., v. 40, p. 95-96.)

Shows efficiency of the "hydro-carbon system" of the Steam Boiler Equipment Co. of New York. Does not describe system, but gives charts indicating elimination of smoke due to its use.

***T., L. de.**
Essais de chaudières à l'usine municipale de Bercy à Paris. 2 diag. 2 dr. 1893. (In Génie civil, v. 23, p. 141-144.)

Deals mainly with Dulac furnace with water circulation; tests showed almost entire absence of smoke.

***Tests** of "smokeless" boiler settings at Chicago. 6 dr. 1908. (In Engineering news, v. 60, p. 251.)

Tests of boiler settings of Chicago school buildings. The City Smoke Inspection Department claimed that the school houses using soft coal were among the worst smoke producers. Tests were made of boiler settings with and without low-arched fire-boxes. Observations of smoke density were made with Ringelmann charts. Results showed slightly less smoke with low-arched fire-box than with standard design formerly used. With the expert firing during test neither smoked seriously.

***Thwaite** smoke annihilator. 600 w. 1 dr. 1892. (In Engineer, London, v. 73, p. 315.)

**The same.* (In Scientific American supplement, v. 33, p. 13675.)

Considerable success was obtained with this apparatus, which admits secondary air supply through wire gauze of specific mesh.

***"Torpedo"** smoke preventer and heat distributer. 700 w. 2 dr. 1910 (In Iron and coal trades review, v. 81, p. 358.)

**The same, abstract translation.* 150 w. 1910. (In Rauch und staub, v. 1, p. 27.)

Hollow firebrick structure of cylindro-conical form, placed behind bridge in direct path of gases. Air heated by the incandescent firebrick escapes through small openings in top and "unites, with the carbon vapor producing immediate combustion."

***Two** experiments in smoke preventing furnaces. 1,800 w. Ill. 1903. (In Engineering news, v. 49, p. 460.)

First apparatus is the invention of J. B. Harris for stationary boilers; has an iron pipe air heater in furnace wall through which air is forced by a motor driven blower. Second is a locomotive firebox with swinging partition arranged for alternate side firing.

***Unique** exhaust head and smokeless system. 1 dr. 1907. (In Engineer, Chicago, v. 44, p. 465.)

Describes device which claims to burn any kind of fuel without smoke.

*[**Untersuchung** rauchverhütender dampfkesselfeuerungen.] 1889. (In Zeitschrift des Vereines deutscher Ingenieure, v. 33, pt. 1, p. 307-308.)

Mentions tests by "Sächsische Ingenieur- und Architektenverein," considering following firing systems: Tenbrink, Schulze-Röber, Cario, Heiser, Donneley, Adam. Results not given.

***Verhinderung** oder verminderung der russ- und flugaschenablagerungen in den heizzügen der flammrohrkesselanlagen. 600 w. 1910. (In Rauch und staub, v. 1, p. 26-27.)

Abstract from "Braunkohle," 29 July, 1910, p. 289-293.

***Vogt.**

[Rauchfrage.] 1886. (In Zeitschrift des Vereines deutscher Ingenieure, v. 30, pt. 1, p. 54-55.)

Abstract of address before Bergischer Bezirksverein. Brief historical notes and discussion of firing methods.

***Walker,** Robert L.

Economical combustion of fuel and the prevention of smoke. Ill. 1898. (In Proceedings of the Engineers' Society of Western Pennsylvania, v. 14, p. 150-169.)

Illustrates and describes the Walker furnace as applied to boilers, puddling and heating furnaces, garbage destructors and locomotives. Gives results of tests.

***Weindörfer,** R.

Zur frage der rauch- und russbelästigung. 4 dr. 1889. (In Glasers annalen für gewerbe und bauwesen, v. 25, p. 96-97.)

Cario apparatus.

***Wilkinson,** W. B.

Smokeless combustion of coal. 1912. (In Power, v. 36, p. 472-473.)

Problem is stated as that of supplying the necessary amount of oxygen.

***Williams, Henry J.**

Smoke prevention. 1894. (In Technology quarterly, v. 7, p. 122-132.)

Considers requirements of smoke-preventing appliances and classifies and briefly describes methods under heads of steam jets, firebrick arches, hollow walls for pre-heating, coking arches, double combustion, down-draft furnaces and mechanical stokers.

***Woodcock,** William.

On the means of avoiding visible smoke, from boiler furnaces. 2 dr. 1854. (In Minutes of Proceedings of the Institution of Civil Engineers, v. 14, p. 1-13.)

Discussion, p. 14-31.

**The same, condensed.* 1855. (In Journal of the Franklin Institute, v. 59, p. 84-86.)

Heat is screened from ash-pit by iron plates. Air entering furnace is therefore cold and unrarefied, and is said on this account to produce a more intense and rapid combustion.

Draft

Chimneys

***C.,** W.

Smoke doctoring. 2,600 w. 1874. (In Chambers's journal, v. 51, p. 474.)

Deals chiefly with chimney design and defects.

Chimney. 1 ill. 1833. (In British cyclopædia of arts and sciences, manufactures, commerce, literature, history, geography, politics, biography, v. 1, p. 304-305.)

Causes of smoky chimneys, describing a revolving hood for chimney tops to facilitate escape of smoke.

Chimney. 4 fig. 1859. (In English encyclopædia, a new dictionary of universal knowledge, arts and sciences, v. 2, p. 842-844.)

History and construction.

Franklin, Benjamin.

Observations on the causes and cure of smoky chimneys by his Excellency Benjamin Franklin, LL. D., F. R. S., President of the State of Pennsylvania and of the American Philosophical Society, &c., in a letter to Dr. Ingen-Housz, physician to the Emperor at Vienna. ed. 2. 56 p. 1 pl. 1787.

**The same.* 1 pl. with 13 dr. 1786. (In Transactions of the American Philosophical Society, v. 2, p. 1-36.)

**The same.* 1906. (In "Writings of Benjamin Franklin, collected and edited . . . by Albert Henry Smith," v. 9, p. 413-443.)

Enumerates all causes of smoking chimneys which have come within his observation, and discusses principles of remedying the trouble; principles which he has "known successfully used for the different cases."

Frend, W[illiam.]

Is it impossible to free the atmosphere of London in a very considerable degree from the smoke and deleterious vapours with which it is hourly impregnated? 1819. (In the Pamphleteer, respectfully dedicated to both Houses of Parliament, v. 15, p. 61-65.)

Ventures opinion that smoke may be greatly reduced in quantity by increasing height of chimneys.

***Kori,** H.

Neuer russ- und funkenfänger. 1 dr. 1888. (In Neueste erfindungen und erfahrungen auf den gebieten der praktischen technik, v. 15, p. 108-109.)

***Lang,** Gustav.

Ein neuer russfänger. 4 ill. 1911. (In Rauch und staub, v. 1, p. 150-152.)

From author's "Schornsteinbau," pt. 4, p. 898 et seq.

***Reinigen** der fabrikschornsteine in Bayern. 350 w. 1912. (In Rauch und staub, v. 3, p. 30.)

***Russ-** und funkenfänger für schornsteine von John in Ilversgehofen bei Erfurt. 125 w. 1 ill. 1912. (In Rauch und staub, v. 3, p. 87.)

Abstract from "Organ für fortschritte des eisenbahnwesens," 1912, no. 19, p. 340.

***Smoke** dissipating chimney. 2 dr. 4 ill. 1911. (In Scientific American, v. 104, p. 550.)

Upper part of chimney is so perforated that smoke does not issue from top in compact stream but in diluted condition from numerous horizontal channels.

Smoking, Count Rumford's method to prevent chimneys from. 1 pl. with 10 ill. n. d. (In Encyclopædia Perthensis or universal dictionary of knowledge, v. 21, p. 80-83.)

***Smoky** chimneys. 130 w. 1 dr. 1824. (In Mechanics' magazine, v. 2, p. 338.)

Improvement on chimney cowl. Satisfactorily used on shipboard, and recommended for use on land.

***Verbund-** rauch- und lüftungskamin von Direktor Schofer in Waiblingen. 100 w. 1910. (In Rauch und staub, v. 1, p. 27.)

Abstract from "Gewerbeblatt aus Württemberg," 15 Jan., 1910, p. 21.

***Wislicenus,** Hans.

Rauchverstreuende gitterschornsteine zur verhütung von abgasschäden. 6 dr. 1911. (In Zeitschrift des Vereines deutscher Ingenieure, v. 55, p. 950-952.)

**The same, abstract translation.* (In Engineering and mining journal, v. 92, p. 596-597.)

By properly located apertures near top of chimney, air is gradually introduced and smoke and gases are diluted.

Mechanical draft

***Blecken,** Carl.

Künstlicher zug zur vermeidung der hohen schornsteine und der rauchbelästigung. 1 dr. 1911. (In Rauch und staub, v. 1, p. 216-219.)

Address before "Architekten- und Ingenieur-Verein," at Frankfort on the Main, 9 Jan., 1911. Study of artificial draft.

***Johnson,** J. B. *and others.*

Smoke prevention. Report on the adaptation of the Williams furnace to one of the boilers of the heating plant of Washington University, St. Louis. 1,000 w. 1885. (In Journal of the Association of Engineering Societies, v. 5, p. 301.)

Furnace using forced draft. Economy was good and operation practically smokeless.

***Smokeless,** chimneyless steam plants. 2 dr. 3 ill. 1912. (In Scientific American supplement, v. 73, p. 356-357.)

Forced draft is said to reduce smoke to a minimum. Plant of the Stadt Elektrizitätswerke Lichtenberg is described.

***Sturtevant** (B. F.) Co.

Mechanical draft; a practical treatise. ed. 2. 1899. 385 p.

Prevention of smoke is shown to be one object of mechanical draft.

Instruction and supervision of firemen

***Ashworth,** Daniel.

Indifference to boiler firing and management. 1893. (In Proceedings of the Engineers' Society of Western Pennsylvania, v. 9, p. 319-325.)

"In all large cities where smoke abatement is being attempted the great stumbling-block is the low grade of intelligence and indifference of the employees."

***Booth,** William Henry.

Training and work of stokers. 1909. (In Papers read at the Smoke Abatement Conferences at Sheffield, March, 1909, p. 19-27.)

Abstract of lectures.

Deals largely with chemistry of combustion and conditions necessary for prevention of smoke.

***Caborne,** W. F.

Stoking. 1912. (In Papers read at the Smoke Abatement Conferences, March . . . 1912, p. 100-103.)

Considers intelligent firing the most important element in smoke prevention.

***Caborne,** W. F.
Stoking and smoke abatement. 3,000 w. 1906. (In Journal of the Royal Sanitary Institute, v. 27, p. 142.)

**The same.* 1906. (In Addresses, papers and discussions at the Conference on Smoke Abatement, p. 70-76.)

Considers good firing the chief factor in smoke prevention and suggests the establishment of instructional courses for firemen.

***Detroit**—Board of Health.
Smoke abatement. General instructions for engineers and firemen. 16 p. 1908.

Booklet dealing with proper operation of Murphy automatic smokeless furnace, Detroit automatic stoker, Jones under-feed stoker, and hand-fired furnaces burning bituminous coal.

***Gebhardt,** G. F.
Rules for firemen using Illinois and Indiana coal in hand-fired furnaces. 1910. (In his "Steam power plant engineering," ed. 3, appendix G, p. 879-880.)

Rules of the Coal Stoking and Anti-Smoke Committee of the Illinois Coal Operators' Association.

***Pearson,** J. Stothart.
Hand-fired boilers—qualification of stokers—overloading of steam boiler plants. 1912. (In Papers read at the Smoke Abatement Conferences, March . . . 1912, p. 120-124.)

Shows importance of trained firemen.

***Pradel.**
Braunkohle und rauchfrage. 20 dr. 2 ill. 1911. (In Rauch und staub, v. 2, p. 29-39, 57-63.)

Discusses approved modern methods of industrial and domestic firing.

***Randall,** D. T.
The fireman at the furnace. 1908. (In Scientific American supplement, v. 65, p. 242-243.)

"Abstract from a bulletin (334) issued by the United States Geological Survey." (U. S. Bureau of Mines, Bulletin 39.)

Brief discussion of principles of good firing and of results of carelessness and indifference on the part of firemen.

***Rideal,** Samuel.
Report based upon returns furnished by manufacturers who have succeeded in securing the abatement of smoke in factories. 600 w. 1906. (In Journal of the Royal Sanitary Institute, v. 27, p. 149.)

**The same.* 1906. (In Addresses, papers and discussions at the Conference on Smoke Abatement, p. 77-79.)

General consensus of opinion seems to favor skill and care in firing as the most important factor.

***Smoke.** 1908. (In Brick, v. 28, p. 233-235.)

Applies principles of proper combustion to kiln firing. Careful firing is shown to be the best means of smoke prevention.

***Switzer,** J. A.
Smoke prevention and the efficiency of firemen; a concrete instance. 2 diag. 1910. (In Engineering magazine, v. 40, p. 83-85.)

Brief statement of practical test of comparative fuel consumption and smoke production on two successive days, with trained and untrained fireman.

***Tätigkeit** der Preussischen Dampfkessel - Überwachungs - Vereine. 1911. (In Glückauf, v. 47, pt. 2, p. 1532-1534.)

**The same, abstract.* 150 w. 1911. (In Rauch und staub, v. 2, p. 51.)

Deals briefly with value of careful attention to proper mechanical and hand firing.

***Terry,** Hubert L.

Notes on town smoke. 1894. (In Transactions of the Sanitary Institute, v. 15, p. 744-749.)

Discusses proposed schemes for lessening smoke nuisance. Favors more thorough training of firemen.

***V.,** K.

Tätigkeit der Preussischen Dampfkessel-Überwachungs-Vereine. 1911. (In Glückauf, v. 47, pt. 1, p. 359.)

**The same, abstract.* 1911. (In Rauch und staub, v. 1, p. 233.)

Résumé of progress in methods of firing.

Mechanical stokers

***American Railway Master Mechanics' Association.**

Report of Committee on Mechanical Stokers. 16 ill. 1 folding pl. 1908. (In Proceedings of the American Railway Master Mechanics' Association, v. 41, p. 59-74.)

Discussion, p. 77-93.

Deals with following types: Victor (formerly the Day-Kincaid), Crosby, Hayden, and Strouse, and is largely compilation from "Railway and locomotive engineering." Mr. Wickhorst, in discussion, states that analyses of smoke gases have shown that by skilful hand firing combustion is almost perfect and this would argue in favor of a method of mechanical stoking which simulates hand firing.

Committee dates from 1905. Earlier reports appear in v. 39, p. 340, and v. 40, p. 57-60, but do not deal with smoke problem.

***American Railway Master Mechanics' Association.**

Report of Committee on Mechanical Stokers. 1 pl. 1909. (In Proceedings of the American Railway Master Mechanics' Association, v. 42, p. 63-67.)

Discussion, p. 68-70.

Considers mainly Strouse and Hayden stokers. States that a successful automatic stoker "should permit close attention to economic handling of fuel and reduction of black smoke." Discussion mentions smoke briefly.

***American Railway Master Mechanics' Association.**

Report of Committee on Mechanical Stokers. 1 diag. 1 folding pl. 5 ill. 1910. (In Proceedings of the American Railway Master Mechanics' Association, v. 43, p. 63-74.)

Discussion, p. 74-93.

Touches briefly on smoke prevention, reporting smokeless operation (except when fire was scraped or grates shaken) of underfeed stoker of the Pennsylvania Lines West. Discusses also several other types.

***American Railway Master Mechanics' Association.**

Report of Committee on Mechanical Stokers. 1911. (In Proceedings of the American Railway Master Mechanics' Association, v. 44, p. 63-67.)

Discussion, p. 67-87.

Report is a brief comment on each type of stoker investigated. Discussion brings out evidence of a number of cases of successful operation without smoke. States that sufficient progress has been made with mechanical stokers "to warrant railroads installing a limited number upon large locomotives at least."

***Beadle,** R. C.
How smoke is prevented: ideal stoker practice. 1 dr. 1913. (In Industrial world, v. 92, n. s. v. 47, pt. 1, p. 145-146.)

Discusses merits of stoker, and describes one type (Class "E" American stoker) presenting claims of smokelessness and high economy.

***Benjamin,** Charles H.
Smoke and its abatement. 30 p. 1905. (In Transactions of the American Society of Mechanical Engineers, v. 26, p. 713.)

**The same.* (In Electrical review, New York, v. 47, p. 13-15.)

**The same.* (In Engineering news, v. 53, p. 617-618.)

**The same.* (In Municipal engineering, v. 30, p. 65-68.)

**The same, condensed.* (In Engineering record, v. 51, p. 719.)

General treatment of the subject, considering bituminous coal only, and not considering fuel economy. Believes that smoke production can be greatly lessened and considers mechanical stokers the best present means of accomplishing this result, in medium-sized or large plants. Shows that unless supported by public sentiment both mechanical devices and legal enactments will fail.

***Benjamin,** Charles H.
Smoke prevention in the power house. 2,000 w. Ill. 1907. (In Cassier's magazine, v. 31, p. 339.)

Clear, simple description of the typical forms of smoke preventing appliances in common use. Favors mechanical stokers, especially the chain grate type.

***Bennis** stokers at the Gemeente Electriciteitswerken, Amsterdam. 1910. (In Engineering, v. 90, p. 700.)

Brief description of boiler plant with sprinkling stokers.

***Carpenter,** Edward.
The smoke-plague and its remedy. 1890. (In Macmillan's magazine, v. 62, p. 204-213.)

Favors mechanical stokers for industrial furnaces, and use of coke or gas for domestic fires.

***Competitive** tests of Murphy stoker and Hawley down-draft furnace at Detroit water works. 1,600 w. 1898. (In Engineering record, v. 37, p. 477.)

With regard to smokeless operation results were favorable to Murphy stoker. Various grades of fuel were tried, the best economy obtained being with the Hawley furnace using Pocahontas coal. With other fuels the Murphy stoker proved superior.

***Fowler,** George L.
Mechanical stokers for locomotives. 1,500 w. Ill. 1907. (In Cassier's magazine, v. 32, p. 75.)

Describes the two types which have, according to author, thus far met with any degree of success in operation. Looks with favor upon their introduction but admits that they do not effect any saving in fuel nor any diminution of smoke.

***Garstang,** William.
Mechanical stokers. 1905. (In Proceedings of the American Railway Master Mechanics' Association, v. 38, p. 288-290.)

Discussion, p. 290-299.
Comment on failure of stoker to eliminate smoke in locomotive firing.

***Hawkins,** R. H.
Smoke prevention. 1,200 w. 1899. (In Yale scientific monthly, v. 6, p. 7.)

General description of mechanical stokers.

***Hutchins,** George P.
Stokers and stoker installations. 1907. (In Engineer, Chicago, v. 44, p. 820-821.)

Fuel economy rather than smoke suppression is considered the end that should be sought.

Huyette, Miles Clayton.
Address to Robert Fulton Association, Illinois, number twenty-eight, N. A. S. E., Chicago, March the eighteenth, nineteen hundred and two. 21 p. 1902. [Chicago?]

Discussion of smoke prevention under various conditions. Favors mechanical stokers.

***Ide,** George R.
Smoke abatement in cities. 3,000 w. Ill. 1892. (In Proceedings of the Engineers' Club of Philadelphia, v. 9, p. 141.)

Author claims that while much may be done by careful hand firing, the remedy lies in the adoption of mechanical stokers, many of the existing types being successful when properly operated.
Folding plates.

***International Correspondence Schools, Scranton, Pa.**
Automatic furnaces and mechanical stokers. 19 p. 12 dr. 1902. (In International library of technology, v. 7, section 18.)

Describes different types of stokers.

***Knowlton,** Howard S.
Practical study in smoke prevention. 1908. (In Power and the engineer, v. 29, p. 1074-1076.)

Gives results of investigation of a large Babcock and Wilcox boiler plant, equipped with Roney stokers. Tests were to determine cause of smoke and to suggest remedies.

***Mayner,** William.
Smokeless combustion and economy of fuel. 1,500 w. Ill. 1905. (In Scientific American supplement, v. 60, p. 24788.)

Application of Wegener's mechanical stoker.

***Peabody,** Cecil H. & **Miller,** Edward F.
Settings, furnaces and chimneys. 20 dr. 1908. (In their "Steam boilers," ed. 2, p. 101-142.)

Briefly describes several types of mechanical stokers and boiler and furnace designs. Gives attention to smoke-prevention features.

***Pearse,** J. Walter.
Mechanical firing of steam boilers. 1 folding pl. with 10 dr. 1877. (In Transactions of the Society of Engineers, v. 17, p. 31-58.)

With discussion.
Deals with development of mechanical stokers, describing many of the more important types at this date (1877).

Popplewell, W. C.
Smoke problem and its possibilities. 8 ill. 1 fig. 1902. (In Feilden's magazine, v. 7, p. 473-487.)

Some general discussion, followed by argument for mechanical stokers, describing various types.

***Prevention** of the emission of dense smoke in cities and in other places. 8,400 w. Ill. 1898. (In Industries and iron, v. 25, p. 548-553.)

Discusses various devices and methods and quotes from a number of authorities on the subject. Gives tests of several mechanical stokers and deals at some length with the Lowe apparatus said to be "the most simple, least costly and most efficient smoke consuming device yet invented."

***Schramm.**
[Selbsttätige und rauchfreie feuerungen.] 1904. (In Zeitschrift des Vereines deutscher Ingenieure, v. 48, pt. 1, p. 175-176.)

Abstract of address before Pommerscher Bezirksverein, dealing with theory of combustion, and with smoke prevention by mechanical stokers.

***Searle,** J. M.
Practical methods of abating smoke. 8 ill. 1912. (In Official proceedings of the Railway Club of Pittsburgh, v. 12, 22 Nov., 1912, p. 5-19.)

Discussion, p. 20-33.

**The same, abstract.* 1913. (In Industrial world, v. 92, n. s. v. 47, pt. 1, p. 129-130.)

Author is (1912) Chief of the Division of Smoke Inspection, City of Pittsburgh. Gives considerable attention to the Crawford locomotive stoker, and its successful application to smokeless firing.

***Searle,** J. M.
What not to do in attempting the conservation of fuel. A few words to the wise by the city smoke inspector of Pittsburgh. Prattle over "cure-alls" versus twentieth century fuel efficiency. 1913. (In Industrial world, v. 92, n. s. v. 47, pt. 1, p. 355-357.)

Address before students of mechanical engineering, University of Pittsburgh, 19 March, 1913.
Favors mechanical stoker and carbon dioxid recorders, with careful attention to the latter as a guide to proper combustion. Looks with disfavor on smoke washing, and on electrical precipitation of soot.

***Smoke** suppression. 1903. (In Engineer, Cleveland, v. 40, p. 771-772.)

Working of Wilkinson automatic stoker.

***Smokeless** automatic stoker. 2 ill. 1902. (In Scientific American, v. 87, p. 102.)

Stoker of Peerless Automatic Smokeless Stoker Company.

***[Storey,** G. B.]
Waste of fuel. 200 w. 1910. (In Colliery guardian, v. 100, p. 1113.)

**The same, translated.* 1911. (In Rauch und staub, v. 1, p. 132-133.)

Abstract of paper before Lancashire Branch of British Association of Textile Managers. Recommends coking type of stoker as more effective in preventing smoke than the sprinkling type.

***Underfeed** stoker. 8 ill. 1910. (In Colliery guardian, v. 100, p. 507-509.)

**The same, abstract translation.* 100 w. 1910. (In Rauch und staub, v. 1, p. 27.)

Manufactured by Underfeed Stoker Co., Ltd., of Coventry House, South-place, Finsbury, E. C. Claim is advanced that this design will "burn smokelessly the cheapest kinds of slack and smudge."

***Yorke,** Wilfred.
Prevention of smoke. 1909. (In Electrical review, London, v. 65, p. 33-34.)

Outlines principles of combustion and describes proper working of mechanical stokers, with table giving grate surface, air supply and smoke formation.

Steam jet devices

***Booth,** William Henry.

A. R. Sennett on smoke prevention. 1,400 w. Ill. 1892. (In Electrical review, London, v. 31, p. 424.)

Abstract of Sennett's paper before the British Association. Classifies devices as smoke consuming and smoke preventing, favoring the latter. Author objects to use of direct steam jet and has devised a system by which the steam is used at a series of injector heads to induce a large flow of air, which enters with the steam at a low pressure.

***Cederblom,** R.

Smoke prevention and fuel combustion. 500 w. 1906. (In Power, v. 26, p. 443.)

Letter asking for information on combustion phenomena in steam jet furnaces.

***Climax** smoke preventer. 1 dr. 1907. (In Engineer, Chicago, v. 44, p. 971.)

Steam jet furnace. "But little steam is used in this device, which not only acts to prevent smoke, but also increases the draft, helps to keep up the boiler pressure . . . and tends to prevent clinker."

***Dulier,** E.

System of purifying the smoke from domestic and other fires. 1892. (In Report of British Association for the Advancement of Science, 1892, p. 880-881.)

Brief abstract of paper. Method consists in mixing smoke as it leaves the flue with small quantities of steam.

***Dulier** system of smoke absorption. 400 w. Ill. 1894 (In Engineering record, v. 29, p. 385.)

Uses steam jet and also a water spray to precipitate the soot and dust.

*"**Eureka**" smoke bleacher. 4 dr. 1894. (In Scientific American, v. 71, p. 261-262.)

Describes Sands's apparatus for precipitating solid matter of smoke by introduction of steam into chimney.

Fitch, J. R. M.

Smoke prevention and fuel economics. 2 fig. 1909. (In Institute of Marine Engineers. Annual volume, comprising the papers read and discussion held. v. 21, p. 1-26.)

**The same, abstract.* (In Practical engineer, London, v. 39, p. 199.)

Deals with examination of fuel (coal), giving rules for sampling, and with control of combustion. Describes an appliance (the "Fumicide smoke consumer and fuel economizer") which he claims to have used for two years with excellent results. The system consists in placing in the furnace bridge a box into which a steam jet forces air, the mixed steam and air being discharged into the furnace through a slit in back of box. To avoid disadvantages of the steam jet, later experiments have been made using a Sturtevant fan instead of the steam jet, to induce the air blast. This modification is estimated to have resulted in a saving in working cost of apparatus of 50% over the steam jet.

***Heber,** Fritz.

Ein neues rauchverbrennungsverfahren für die industrie. System Bender-Dr. Lehmann. 4 diag. 2 dr. 1911. In Journal für gasbeleuchtung, v. 54, p. 773-775.)

Process, in which almost complete prevention of smoke is claimed, consists of forcing superheated steam into the fire box, with formation of carbon monoxid and hydrogen, which burn with intense heat and cause escaping hydrocarbons to be burned.

***"Hill"** patent boiler furnace. 3 dr. 1 ill. 1910. (In Iron and coal trades review, v. 81, p. 436.)

**The same, abstract translation*.* 1910. (In Rauch und staub, v. 1, p. 93.)

Simple construction, adaptable to any type of boiler and claimed to be "an absolute smoke consumer." Combustion assisted by draft induced by steam jets.

***Hutchinson** smoke consumer. 200 w. Ill. 1891. (In Railroad and engineering journal, v. 65, p. 42.)

Steam jet device in use on locomotives.

***Johnson's** smoke-preventing appliance. 400 w. 1 dr. 1892. (In Industries, v. 12, p. 296.)

Steam injector is used. Secondary air supply comes in contact with unconsumed gases in region of high temperature.

***McMynn,** John C.

A comparative test of two types of smokeless furnaces. 1,800 w. 1893. (In Journal of the Association of Engineering Societies, v. 12, p. 233.)

Tabulated results unfavorable to the use of steam jets.

"These trials bring out one fact prominently, that the combustion was more complete in boiler 'A' [furnace without steam jets] than in 'B' [furnace equipped with steam jets] and an increased evaporation and a decrease of smoke followed."

***Misostow,** H.

Smoke prevention with automatic steam jets. 1912. (In Power, v. 36, p. 838.)

Reply to letter by Switzer.

***Needle** jets of superheated steam to prevent smoke: the Luckenbach boiler furnace. 5 dr. 1910. (In Engineering news, v. 64, p. 713-714.)

***Nickell,** F. E.

Something bizarre in recent smoke consumer styles. Performs on continuous cycle plan; nothing lost except obnoxious gases; device protected by patent. 2 dr. 1912. (In National engineer, v. 16, p. 757-758.)

Mainly an explanation of the drawings. Steam used "for creating a draft that will draw the smoke back into the furnace where it will be burned up." Steam also induces air to partially supply combustion.

***Odell,** W. H.

Device for preventing smoke. 3 dr. 1911. (In Power, v. 33, p. 66-67.)

Depends on the use of hot blast which is drawn into the combustion chamber by means of a steam jet.

***Palmer,** R. H.

Steam jets for preventing smoke. 700 w. Ill. 1903. (In American machinist, v. 26, pt. 2, p. 936.)

Said to give good results with various fuels; fuel economy is not mentioned.

***Parker,** T. T.

Smoke abolition. 1,500 w. Ill. 1902. (In American machinist, v. 25, pt. 2, p. 1480.)

Confined to horizontal tubular steam boilers. Advocates an extension firebrick arch running under the front boiler head back to the fire doors, or, where space is limited, small arches at the bridge wall. Favors also the steam jet and describes a simple form.

***Puddington,** A. W.
Steam jets and their uses. 1908. (In Industrial world, v. 83, n. s. v. 42, July 13, p. v-xiv.)

Principles of smokeless combustion and application of steam jet as method of smoke prevention.

***Rauchverbrennung.** 2 diag. 3 dr. 1907. (In Dingler's polytechnisches journal, v. 322, p. 410-413.)

Describes automatic apparatus for introducing air through firing doors, steam being injected simultaneously by jet.

***Sargent** smoke preventing apparatus. 800 w. 1892. (In Engineering news, v. 28, p. 436.)

Automatically controlled steam jet for air injection. Claims successful smoke prevention and some saving in fuel.

***Schulz-Straznicki,** v.
Ueber schwarzrauch und mittel zur verminderung desselben 4 dr. 1893. (In Zeitschrift des Oesterreichischen Ingenieur- und Architekten-Vereines, v. 45, p. 370-371.)

Refers particularly to author's apparatus for application to either locomotive or stationary boilers. Makes use of steam jet.

***Sennett,** A. R.
Note on the prevention of smoke in steam boiler and other furnaces. 6 dr. 1892. (In Engineer, London, v. 74, p. 179-180.)

Paper before British Association for the Advancement of Science. Reviews conditions necessary to smokeless combustion. Favors injecting steam through injector head with air admission.
See also Booth, W. H.

***Smoke** prevention tests. 1907. (In Engineering record, v. 55, p. 378.)

Briefly gives tests with Ganz apparatus, consisting of steam jet with air supply and adjustable smoke damper.

***Steam-jet** as a means of preventing smoke from boiler furnaces. 1.000 w. Ill. 1891. (In Engineering news, v. 25, p. 314.)

Discusses the steam jet devices of Hutchinson, Clark and Buchanan with particular reference to locomotive operation. Concludes that in general the use of steam jets may show some gain in the way of smoke prevention but it is at the expense of fuel economy.

***Strohm,** R. T.
"Smoke prevention and fuel combustion." 300 w. 1906. (In Power, v. 26, p. 635.)

Reply to letter of R. Cederblom (p. 443), on combustion with steam jets.

***Successful** smoke prevention. 700 w. Ill. 1902. (In Railway and engineering review, v. 42, p. 89.)

Apparatus in operation at shops of the Chicago Bridge and Iron Works. Automatic steam jet device introducing heated air from ash-pit.

***Switzer,** J. A.
Economy of smoke prevention. 5 diag. 1910. (In Engineering magazine, v. 40, p. 406-412.)

Offers quantitative evidence as to effectiveness and operating cost of suitable steam jet devices for boiler furnaces.

***Switzer,** J. A.
Smoke prevention with automatic steam jet. 1912. (In Power, v. 36, p. 362.)

Letter, in answer to criticism, showing beneficial use of steam jet.

***Switzer,** J. A.

Smoke prevention with steam jets. 2 diag. 5 ill. 1912. (In Power, v. 35, p. 75-78.)

Detailed description of tests of Knoxville Ry. & Light Co., and Knoxville Cotton Mills. Smoke consumers were installed under a contract guaranteeing to increase capacity of plant 10 per cent., to reduce accumulation of soot on tubes 50 per cent., and to effect an actual saving of 10 per cent. in fuel. This in addition to reducing smoke.

Introduction of automatically controlled steam jets reduced smoke production about 90 per cent. and greatly increased plant efficiency.

Tomilson, William.

New smoke burning furnace. Ill. 1892. (In Stationary engineer, v. 11, p. 142.)

Steam jet, either flat or round, to force incoming air down upon ignited fuel.

Smoke "consumers"

***"Acme"** smoke consumer. 600 w. 2 dr. 1892. (In Industries, v. 13, p. 484.)

Simple apparatus in which smoke must pass considerable incandescent brick surface.

*Appareil fumivore Orvis. 4 dr. 1898. (In L'Électricien, v. 30, p. 207-210.)

Describes apparatus based on use of steam air-injector.

***Belugou,** V.

La fumivorité des foyers. Resultats d'expériences faites au service des tubes pneumatiques de Paris. 1,100 w. Ill. 1902. (In Génie civil, v. 41, p. 106.)

Describes the Sabourain smoke consuming furnace which has produced very satisfactory results in actual operation.

***Binder,** O.

New smoke burning process for the industries. 1912. (In Chemiker-zeitung, v. 36, p. 201.)

***Brunton's** smoke consuming apparatus. 3 ill. 1823. (In Mechanic's magazine, v. 1, p. 121-123.)

Carlile, W. A.

English smoke consumers. 1895. (In American machinist, v. 18, p. 961-962.)

Paper by British author. Reviews methods and equipment, admitting that no satisfactory device has yet (1895) been developed.

***Des Mazis,** R.

Nouveau fumivore. 2 dr. 1895. (In Génie civil, v. 27, p. 142-143.)

Describes Bougier's apparatus, allowing of forced distribution of air under all parts of the grate.

***Fouquet.**

[Eine neue vorrichtung zur rauchverbrennung für gewerbliche anlagen.] 1900. (In Zeitschrift des Vereines deutscher Ingenieure, v. 44, pt. 1, p. 222-223.)

Abstract of address before Hamburger Bezirksverein.

Takes up conditions for proper combustion and briefly mentions device designed to insure pre-heating of air and prevent lowering of temperature in furnace. Schmidt's apparatus.

***Foyer** fumivore pour chaudières, système Fritz Maier et S. Kanitz. 9 dr. 1898. (In L'Électricien, v. 30, p. 152-154.)

***Fumivore** Orvis. 5 dr. 1885. (In Génie civil, v. 7, p. 395-396.)

***Fumivorité** des chaudières à vapeur; perfectionnements apportés au fumivore Orvis. 3 dr. 1888. (In La Nature, v. 30, p. 253-254.)

***Hinstin,** Jh.

Nouveau système de foyer fumivore appliqué aux fours industriels, chaudières et foyers domestiques. 35 p. Ill. (In Mémoires de la Société des Ingénieurs Civils de France, 1894, pt. 2, p. 23.)

Method patented by the author. Based largely on regulation of air supply. Has particular reference to coke burning. The industrial furnaces include those used in the ceramic industry, distillation and cremation.
Folding plates.

***Hinstin** smoke-consuming furnace. 600 w. Ill. 1898. (In Colliery guardian, v. 76, p. 166.)

Abstract translation from "La revue technique."
Automatic regulation of air supply. The fire-bars are sloping and the quantity of air admitted to any part of the furnace is inversely proportional to the thickness of the layer of fuel at that point.

***Improvement** in smoke consuming furnaces. 1 dr. 1900. (In Scientific American, v. 96, n. s. v. 82, p. 196.)

Furnace patented by William C. Johnson of Memphis, Tenn. Invention consists in controlling air supply. Air admission is effected during firing and for a brief interval afterwards, a float valve operated by closing the fire door gradually closing the air passage also.

Interesting smoke burning furnace. 1892. (In Stationary engineer, v. 11, p. 61-62.)

Perfect combustion with one-third block coal and two-thirds screenings.

***Lowrie,** Will L.

New smoke-consuming furnace. 1910. (In Electrical review and western electrician, v. 57, p. 853.)

Gives information on furnace invented by Alois Sichert of Carlsbad, in which draft of hot air is driven down on fire, causing smoke to be completely consumed.

***Morrison,** John.

Noxious vapours of manure works. 1891. (In Journal of the Society of Chemical Industry, v. 10, p. 338-340.)

Describes apparatus designed by author and used for arresting fumes from fertilizer works. Claims that destruction of organic matters by passing over a fire "is a sheer impossibility. You can no more burn them by racing the gases impregnated with them over a fire, than you can similarly burn smoke. To talk about burning smoke is, of course—practically speaking—to talk nonsense, and the only sensible talk relates to its prevention. Once produced, it, of necessity, goes to the chimney."

***New** smoke-consuming furnace. 2 ill. 1903. (In Street railway journal, v. 22, p. 1067-1068.)

Sheet iron supply flues in close contact with the fire allow hot air to reach the fire in greater quantity.

***Orvis,** Orland D.

Smoke abatement. 1887. (In Transactions of the Sanitary Institute of Great Britain, v. 9, p. 328-335.)

Discussion, p. 335.
Reviews devices for prevention and advocates use of the "air vacuum."

***Prevention** of smoke by combustion. 1 dr. 1 ill. 1912. (In Mines and minerals, v. 32, p. 584-585.)

Improvement consists in addition of fireclay tubes in furnace to retain heat for burning distilled gases.

***R.**

Another mode of consuming smoke suggested. 1824. (In Mechanics' magazine, v. 2, p. 251-252.)

Letter, suggesting "that it might not be impracticable to ignite the smoke with carburetted, hydrogen, or coal-gas, in some part or other of the boiler-flue."

***R—y, W.**

Consuming smoke. 150 w. 1825. (In Mechanics' magazine, v. 3, p. 315.)

Letter proposing small globular firebrick furnace connected with chimney and supplied with double bellows, worked by engine, "which shall constantly blow a stream of fire into the chimney, that will . . . ignite the smoke as it passes up, and cause it to rise in a flame."

***Rauchverbrennungs-apparat** von C. W. Stauss in Berlin. 10 dr. 1891. (In Glasers annalen für gewerbe und bauwesen, v. 29, p. 138-140.)

***Richard,** Gustave.

Rapport . . . sur le foyer fumivore de M. Dulac. 3 diag. 7 dr. 1894. (In Bulletin de la Société d'Encouragement pour l'Industrie Nationale, v. 93, n. s. v. 9, p. 326-336.)

Report on Dulac device, consisting of an inclined grate, on which the combustion takes place in two stages.

***Seiler.**

Die rauchverzehrende sog. wehrfeuerung von Wilmsmann. 2,000 w. Ill. 1888. (In Journal für gasbeleuchtung, v. 31, p. 135.)

**The same, abstract translation.* 500 w. (In Minutes of Proceedings of the Institution of Civil Engineers, v. 95, p. 464.)

Gases and smoke are deflected by a shield and made to pass through incandescent coal bed on way to flues.

Seyferth, August.

Die verschiedenen rauchverbrennungs-einrichtungen. 99 p. 17 pl. 1860. (Mittheilungen des sächsischen Ingenieur-Vereines, heft. 2.)

**The same, review.* 1881. (In Zeitschrift des Vereines deutscher Ingenieure, v. 5, p. 227-229.)

***Sickel's** smoke consumer. 500 w. 3 dr. 1889. (In Iron, v. 34, p. 460, 462.)

**The same.* (In Scientific American supplement, v. 29, p. 11739.)

Describes German device for promoting the mixing of air with the gases of combustion.

***Silbermann,** A.

Rauchverzehrende herdvorrichtung; construirt von A. Silbermann, baumeister und techniker in Breslau. Dr. 1856. (In Dingler's polytechnisches journal, v. 139, p. 81-83.)

***Smith,** Frank C.

Smoke burning furnaces. 15 dr. 1884. (In Scientific American supplement, v. 17, p. 6698-6699.)

Describes and illustrates many devices used with more or less success for stationary and locomotive work in England and America.

***Smoke** "annihilator." 400 w. 1 dr. 1891. (In Industries, v. 11, p. 172.)

Secondary air supply is provided for burning escaping carbon monoxid and hydrocarbons in such a way that the chimney draft is not impaired.

***Statham,** Francis F.
On the consumption of smoke in furnaces and manufacturing premises. 1,000 w. 1 dr. 1853. (In Report of the British Association for the Advancement of Science, v. 23, p. 127.)

Describes smoke consuming device, by which escaping gases are made to pass through red-hot tubes.

***Wilskemp** smoke consumer. 3 dr. 1903. (In Engineer, London, v. 95, p. 480.)

Additional apparatus consists of small gas producer to supply gas to pre-heat firebrick arch.

Winkler, Clemens.
Mittheilung über die versuche zur beseitigung des hüttenrauchs bei der Schneeberger ultramarinfabrik zu Schindler's werk bei Bockau in Sachsen. 1 folding pl. 1880. (In Jahrbuch für das berg- und hüttenwesen im Königreiche Sachsen, auf das jahr 1880, pt. 1, abhandlungen, p. 50-70.)

Plate shows contrivance for treatment of gases.

Purification by washing, filtering or settling

***Apparatus** for filtering air and smoke. 3 ill. 1900. (In Scientific American supplement, v. 49, p. 20371.)

From "Revue industrielle."
Especially designed for use on locomotive stacks and for filtering air entering apartments. Air passes through spray formed by jets of steam or water striking blades of revolving screw.

***Davies,** S. H. & **Fryer,** F. G.
Removal of dust and smoke from chimney gases. 2 dr. 1906. (In Electrical engineer, London, v. 44, p. 205-208.)

**The same, condensed.* (In Engineering record, v. 54, p. 272.)

Washing the escaping gases by means of a water spray was found to be effective. Concludes that treating fuel with lime water has no effect on sulphur acids produced.

***Ebaugh,** W. Clarence.
Neutralization and filtration of smelter smoke. 1910. (In Journal of industrial and engineering chemistry, v. 2, p. 372-373.)

**The same, translated.* 1910. (In Rauch und staub, v. 1, p. 43-45.)

Successful operation has been attained by neutralizing all gases with zinc oxid and filtering the cooled mixture through bags.

***Elliott** smoke annihilator. 800 w. 1890. (In Electrician, v. 25, p. 206.)

Describes device in which smoke is washed by forced contact with water.

***Elliott's** "smoke annihilator." 2 dr. 1890. (In Industries, v. 9, p. 8-9.)

***English** smoke annihilator. 2 dr. 1890. (In Manufacturer and builder, v. 22, p. 250.)

Describes Elliott smoke annihilator.

***Interesting** smoke-washing device. 1,000 w. Ill. 1897. (In Engineering record, v. 35, p. 210.)

New York Steam Company plant.
Installed principally to prevent the issue of fine white powder (evidently coal ash), from the chimneys. Waste gases are mingled three times with falling water and all soot and fine ashes removed.

***Kausch.**
Die in Deutschland patentierten verfahren und vorrichtungen zum entstauben von luft und industriegasen. 28 ill. 1911. (In Rauch und staub, v. 1, p. 282-290, 318-325.)

German devices for filtering, washing or otherwise purifying air, smoke and industrial gases.

***Kershaw,** John B. C.
Washing dust and smoke from chimney gases at York, England. 2 dr. 1911. (In Engineering news, v. 65, p. 255-256.)

**The same, condensed.* (In Engineering magazine, v. 41, p. 153-156.)

**The same, translated, with drawings on enlarged scale.* 1911. (In Rauch und staub, v. 1, p. 143-147.)

"Smoke washer" was a brick-lined chamber, in which the gases came in contact with the spray of cold water. Steel chimney shown in drawings, subsequently changed to one of wood to avoid trouble from sulphuric acid.

***Lee,** George B.
Settling fine dust at Copper Queen smeltery. Experiments proved that dust chambers 125 feet long were efficient when gas velocity did not exceed 150 feet per minute. 7 diag. tables. 1910. (In Engineering and mining journal, v. 90, p. 504-506.)

**The same, translated,* 1910. (In Rauch und staub, v. 1, p. 14-18.)

"Series of experiments . . . on a large scale as regards the quantity of smoke handled."

***M.**
Anlage zur rauchverhütung. 3 dr. 1893. (In Zeitschrift des Vereines deutscher Ingenieure, v. 37, pt. 2, p. 914-915.)

Abstract from "Revue industrielle," 18 March, 1893.
French smoke washing plant built by Moet & Chandon.

***Patterson's** suction draught and smoke-preventing apparatus. 1,800 w. 10 dr. 1895. (In Engineering, v. 60, p. 782.)

**The same, abstract translation.* 1896. (In Zeitschrift des Vereines deutscher Ingenieure, v. 40, pt. 1, p. 81-82.)

Essential feature is the introduction through the fan center of a jet of water which is sprayed out among the vanes, thus keeping fan cool and cleansing gases. Gives details of test by Professor Archibald Barr.

***Pradel.**
Entrussungsanlagen-system Müller-Bomhard. 6 dr. 1 ill. 1912. (In Rauch und staub, v. 2, p. 89-93.)

Smoke washer in Berlin. Water jet used for dampening solid particles.

***Preston,** E. Floyd.
Smoke nuisance; its possible abatement by a process of distillation. Ill. 1898. (In Proceedings of the Engineers' Society of Western Pennsylvania, v. 14, p. 142-150.)

Describes author's device for removing greater part of carbon from coal smoke by trapping and distilling. Especially applicable to domestic chimneys.

***Rowntree & Co., Ltd.**
Einrichtung zur entfernung von kohlenstaub und rauch (rauchwaschanlage) auf den Rowntree Cocoa Works in York (England). 2 ill. 1911. (In Rauch und staub, v. 1, p. 276-279.)
Description of smoke scrubbing chambers.

Schlösser, E. & **Ernst,** A.
Verfahren und vorrichtung zur gewinnung des flugstaubes in den rauchkanälen und condensationsraumen von hüttenwerken, fabriken, dampfkessel- und sonstigen feuerungs-anlagen. 8 p. 1 plate. 1885.

***Smoke** and fumes annihilator. 2 dr. 1891. (In Scientific American supplement, v. 32, p. 12955.)

From "Textile industries."
Describes Elliott smoke washer.

***Smoke**-washing apparatus. 1903. (In Scientific American supplement, v. 56, p. 23112.)

Describes Mugna's apparatus, in which smoke is washed by intimate contact with flowing water.

***Spitta.**
Welche fortschritte sind mit dem entsäuren der rauchgase gemacht worden? 3 dr. 1900. (In Thonindustrie-zeitung, v. 24, pt. 1, p. 951-953.)

Process in which the smoke gases are freed from sulphur dioxid by contact with lime, which is converted to calcium sulphite.

***Wright,** Lewis T.
Flue dust and fume in smeltery gases. 1910. (In Engineering and mining journal, v. 90, p. 111-112.)

**The same, translated,* 1910. (In Rauch und staub, v. 1, p. 81-83.)

Deposition of dust demands reduced velocity; deposition from fumes is matter of low temperature. Introduction of outside air into flues is considered inadvisable.

Electrical precipitation of suspended matter of smoke and fumes

See also Effect on atmospheric conditions. Dust. Fog.

Barus, Carl.
Report on the condensation of atmospheric moisture. 104 p. 4 pl. 27 fig. (United States—Weather Bureau. Bulletin 12.)

Not directly concerned with smoke, but gives considerable attention to effect of dust in air. Gives many foot-note references and will be of interest in connection with precipitation methods of smoke abatement.

***Bradley,** Linn.
Electrical precipitation of dust and fumes. Cottrell processes. 1912. (In Original communications of the Eighth International Congress of Applied Chemistry, v. 26 [Apx. sec. 6a-11b.], p. 471-478.)

**The same.* 1913. (In Transactions of the American Electrochemical Society, v. 22, p. 489-497.)

Brief review of processes.

***Bradley,** Linn.
Electrical precipitation of suspended particles. 1913. (In Proceedings of the Engineers' Society of Western Pennsylvania, v 29, p. 111-127.)

Discussion, p. 127-133.
Review of Cottrell process for removing suspended particles from gases by means of high tension electric current. Outlines present (1913) applications and discusses difficulties encountered.

***Cause** of dirt-marking beneath open wiring. 250 w. 1913. (In Electrical world, v. 61, p. 203.)

Answer to query regarding deposition of dust on walls beneath ungrounded wiring. Attributed to difference of potential between charged wire and earth causing attraction of dust particles.

***Cottrell,** F. G.
Electrical precipitation of suspended particles. 2 dr. 28 ill. 1911. (In Journal of industrial and engineering chemistry, v. 3, p. 542-550.)

**The same, abstract.* 2 dr. 12 ill. 1911. (In Engineering news, v. 66, p. 495-498.)

**The same, abstract.* 1911. (In Engineering and mining journal, v. 92, p. 763-764.)

**The same, abstract.* 1 dr. 8 ill. 1911. (In Scientific American supplement, v. 72, p. 215-218.)

**The same, condensed.* 1911. (In Mining science, v. 64, p. 350-351, 364-366.)

**The same, translated.* 1912. (In Rauch und staub, v. 2, p. 187-195.)

Foot-note references.

Considers development of process and application to sulphur fumes, especially from smelting plants, etc., with some attention to precipitation of inorganic dust in general.

***Cottrell** process for condensing smelter fumes. 2 dr. 1908. (In Engineering and mining journal, v. 86, p. 375-377.)

Describes principles and apparatus of this process, separating finely divided solid particles from gases by application of electric charges. Process has been successfully used by Selby Smelting and Lead Company.

***Dieudonné,** Ém.
La condensation des fumées par l' électricité statique. 3 dr. 1886. (In La lumière électrique, v. 19, p. 207-210.)

**The same, translated.* 1,200 w. (In Scientific American supplement, v. 21, p. 8543.)

Refers particularly to Lodge's experiments.

***Dissipation** of fog and smoke. 1909. (In Scientific American, v. 114, p. 318.)

Briefly describes experiments of Dibos, using Hertzian waves and oxyhydrogen flames.

***Dry** fogs. 1881. (In Journal of the Society of Arts, v. 29, p. 285-286.)

Brief note on experimental work and various papers of Aitken.

***Hempel,** O.
Condensation des fumées par l'électricité statique; appareils de demonstration. 1886. (In Bulletin de la Société Internationale des Électriciens, v. 3, p. 61-63.)

***Irvine,** Robert.
Condensation of carbon particles in smoke. 1 dr. 1890. (In Journal of the Society of Chemical Industry, v. 9, p. 1110-1112.)

**The same.* (In Scientific American supplement, v. 31, p. 12651-12652.)

Discusses methods for causing carbon particles of smoke to separate out.

***Irvine,** Robert.
Note on the condensation of carbon particles in smoke. 1889. (In Journal of the Society of Chemical Industry, v. 8, p. 377-378.)

Brief description of experiments in electrification of smoke.

***Lodge,** Oliver J.
Dust. 1885. (In Nature, v. 31, p. 265-269.)

Address before British Association for the Advancement of Science, Montreal.

Treats of dust of all kinds, including the constituent parts of smoke and fog, and considers its origin and behavior. Touches briefly on electrical precipitation of dust.

***Lodge,** Oliver J.
Dust-free spaces. 1 dr. 1884. (In Nature, v. 29, p. 610-613.)

Lecture before Royal Dublin Society.
Draws no distinction between dust and smoke. Considers the settling of smoke and dust particles by electric discharge to be practicable.

***Lodge,** Oliver J.
Electrical deposition of dust and smoke, with special reference to the collection of metallic fume and to a possible purification of the atmosphere. 4 dr. 1886. (In Journal of the Society of Chemical Industry, v. 5, p. 572-576.)

"References to the literature of the subject," p. 575-576.

***Lodge,** Oliver J.
On Lord Rayleigh's dark plane. 1 dr. 1883. (In Nature, v. 28, p. 297-299.)

Letter, discussing dust in air. Suggests clearing of smoky air by electric discharge.

***Lodge,** Oliver J.
Presidential address. 3,000 w. 1906. (In Journal of the Royal Sanitary Institute, v. 27, p. 42.)

**The same.* 1906. (In Addresses, papers and discussions at Conference on Smoke Abatement, p. 1-7.)

Suggests two methods for smoke abatement. The electrification of air on a large scale which is dismissed on account of expense, and the burning of coal where mined producing either gas or electric power for transmission to cities.

***Lodge,** Oliver J. & **Clark,** J. W.
On the phenomena exhibited by dusty air in the neighborhood of strongly illuminated bodies. 1 dr. 1884. (In Proceedings of the Physical Society of London, v. 6, p. 1-29.)

**The same.* (In Philosophical magazine, v. 183, ser. 5, v. 17, p. 214-239.)

**The same, condensed.* (In Nature, v. 29, p. 417-418.)

Consideration of dust coatings surrounding solid bodies. Main causes of "dust-freeness" considered to be due to molecular bombardment and gravitative settling.

***McAdie,** Alexander G.
Disposition of smoke. 800 w. 1910. (In United States—Weather Bureau. Monthly weather review, v. 38, pt. 2, p. 1107.)
Briefly describes Cottrell precipitation process.

***New** application of electricity. 1885. (In Engineering, v. 39, p. 627-628.)

**The same.* 1885. (In American architect and building news, v. 17, p. 305-306.)

Describes process developed by Lodge and Walker, in which lead fumes were precipitated on a practical scale by electric discharge from a static machine.

***Reeve,** A. B.
Smoke and fume prevention by electricity. 4 ill. 1912. (In Yale scientific monthly, v. 19, p. 96-101.)

Applies particularly to Cottrell process for electrical precipitation of suspended particles in smelter smoke.

***Strong,** W. W.
Electrical precipitation of carbon smoke; summary. 1912. (In

***Strong,** W. W.—*continued.*
Original communications of the Eighth International Congress of Applied Chemistry, v. 26 [Apx. sec. 6a-11b.], p. 617-619.)

Excellent summary. Though not yet attempted on a commercial scale, laboratory experiments indicate that the problem is essentially the same as that of the precipitation of fumes and dust.

***Strong,** W. W.
Electrical precipitation of suspended matter in gases 2 dr. 1912. (In Journal of the Franklin Institute, v. 174, p. 239-263.)

Author is particularly interested in precipitation of coal smoke and includes brief account of his experiments in this branch of the subject.

***[Strong,** W. W.]
Niederschlagen von staub, rauch, dämpfen, usw. durch elektrizität. 1912. (In Rauch und staub, v. 2, p. 241-245.)

Through an error this article is credited to Raymond C. Benner.

Good summary of development and present state of electrical precipitation process.

***Tissandier, Gaston.**
Condensation des fumées par l'électricité statique. 2 ill. 1886. (In La Nature, v. 26, p. 241-242.)

**The same, condensed translation.* (In Electrician, v. 17, p. 33.)

**The same, condensed translation.* (In Scientific American, v. 68, n. s. v. 54, p. 255, 260.)

Reviews work of Lodge on condensation of fumes by electric discharge.

Wright, J.
Possibilities of electrical smoke deposition. 1,000 w. 1900. (In Electrical review, London, v. 47, p. 811-812.)

Reviews theories of Rayleigh and Lodge on the dispelling of smoke and fog by electricity, and favors development of process based on their experiments.

Work of Organizations. Exhibitions

See also Serial publications. Smoke problem in special localities.

General

***Hood,** O. P.
Purposes of a smoke abatement league: an answer to many inquiries. 1913. (In Industrial world, v. 92, n. s. v. 47, pt. 1, p. 133.)

Paper at organization of Smoke Abatement League in Pittsburgh. By Chief Mechanical Engineer, U. S. Bureau of Mines.

***International Congress on Hygiene and Demography (15th), Washington, 1912.**
Problem of smoke nuisance in industrial cities. 1912. (In its Preliminary announcement, ed. 9, p. 32.)

Gives the "Provisional program." Section 4, subsection 18, dealing with above subject, lists five proposed papers as follows:

"How and why smoke is injurious," by Raymond C. Benner.—"Influences of heavy smoke on acute and chronic lung infections," by William Charles White.—"Prevention of smoke nuisance," by C. W. A. Veditz.—"Carbon-monoxide," by George L. Apfelbach.—"A psychosis following carbon-monoxide poisoning with complete recovery," by Mary O'Malley.

Transactions not yet published, 1 June, 1913.

France

***Seine, Département de la**—Préfecture.
Commission d'études sur les fumées. Compte rendu [5 p.] 1906-07.

Typewritten copy.

***Seine, Département de la**—Préfecture.
Concours pour la suppression des fumées produits par les foyers de chaudières à vapeur. Rapport de la commission technique. 151 p. 25 pl. Ill. 1898?

**The same, condensed.* 11 dr. 1898. (In Génie civil, v. 33, p. 171-174, 189-193.)

**The same, condensed.* 76 p. 1898. (In Revue de mecanique, v. 2, p. 337, 605; v. 3, p. 283, 648.)

**The same, condensed translation,* from "La Nature." 1,200 w. Ill. 1899. (In Scientific American supplement, v. 47, p. 19367, 19419.)

Probably the most extensive tests ever conducted up to this time (1898).
In 1894 prizes were offered for the best smoke consuming devices. Of 110 competitors three were Americans. After a preliminary investigation thirty devices were retained and subjected to a thorough test in actual operation. Investigation lasted more than three years. The first prize was not awarded; the second was divided between the apparatus of Donneley and that of Proctor, and the third awarded to the Hawley down-draft furnace. Honorable mention was received by the devices of Dulac, Hinstin and Orvis.

Germany and Austria

Ascher, Louis, *and others.*
Erster bericht der Kommission zur Bekämpfung des Rauches in Königsberg i. Pr. 4 ill. 1907.

The same, review. (In Deutsche vierteljahrsschrift für öffentliche gesundheitspflege, v. 39, p. 845-846.)

Reprinted from "Schriften der Physikalisch-ökonomisch Gesellschaft zu Königsberg i. Pr.," 1907. v. 48, pt. 2, p. 121-154.

The same, abstract. (In Jahresbericht der Vereinigung für Angewandte Botanik, v. 6, p. 96-100.)

Presents briefly some features of the report. Five parts were presented respectively by Ascher, Rolin, Kobbert (2), and Hurdelbrink.

***Erster** jahresbericht der Smoke Abatement League of Great Britain. 1911. (In Rauch und staub, v. 1, p. 105-109.)

German review of report, and of papers at Annual Conference, Glasgow. 1910.

***Generalversammlung** der Oesterreichischen Gesellschaft zur Bekämpfung der Rauch- und Staubplage. 1912. (In Rauch und staub, v. 2, p. 273-277.)

From their "Mitteilungen," v. 6, no. 4.

***Kershaw,** John B. C.
Aims and work of the Hamburg Smoke Abatement Society. 2,000 w. 1906. (In Journal of the Royal Sanitary Institute, v. 27, p. 163.)

**The same.* 1906. (In Addresses, papers and discussions at the Conference on Smoke Abatement, p. 91-96.)

Emphasis is laid on the necessity of trained stokers.

*__Kershaw,__ John B. C.
Industrial smoke prevention in Hamburg. 1 dr. 1909. (In Electrical review and western electrician, v. 55, p. 788-789.)

Information concerning the work of the Hamburg Smoke Abatement Society.
See also editorial, p. 771.

*__Kershaw,__ John B. C.
Work of the Hamburg Manufacturers' Smoke Abatement Society. 1909. (In Papers read at the Smoke Abatement Conferences at Sheffield, March, 1909, p. 28-34.)

Reviews methods of working, where the Society lays emphasis on installation of proper apparatus and on stoking by experienced men.

*__Mitteilungen__ der Oesterreichischen Gesellschaft zur Bekämpfung der Rauch- und Staubplage. 250 w. 1911. (In Rauch und staub, v. 1, p. 407.)

Abstract.

*__Nies,__ E.
Aims and works of the Hamburg Abatement Society. 1912. (In Papers read at the Smoke Abatement Conferences, March . . . 1912, p. 46-50.)

Gives particular attention to principles and practice of stoking, and emphasizes economy of proper firing.

*__Nies,__ E.
Bericht des Vereins für Feuerungsbetrieb und Rauchbekämpfung in Hamburg über seine tätigkeit im jahre 1910. 1911. (In Rauch und staub, v. 1, p. 275-276.)

*__Nies,__ E.
Bericht des Vereins für Feuerungsbetrieb und Rauchbekämpfung in Hamburg, über seine tätigkeit im jahre 1911. 1912. (In Rauch und staub, v. 2, p. 271-272.)

*[__Rauchschädenkommission__ des Königlichen Finanzministeriums.] 350 w. 1910. (In Zeitschrift des Vereines deutscher Ingenieure, v. 54, pt. 1, p. 995.)
**The same, abstract.* 200 w. 1910. (In Rauch und staub, v. 1, p. 25.)

Conditions in Saxony.

*__Verein deutscher Ingenieure.__
Antrag des Berliner Bezirksvereines betreffend die rauchbelästigung in grossen städten; 1889-1891. (In Zeitschrift des Vereines deutscher Ingenieure, v. 33, pt. 1, p. 551-552; v. 34, pt. 2, p. 1098-1100, 1124-1128, 1249; v. 35, pt. 1, p. 27.)

*Verein deutscher Ingenieure.
Preisausschreiben zur frage der rauchbelästigung. 1893. (In Zeitschrift des Vereines deutscher Ingenieure, v. 37, pt. 1, p. 1151-1152, 1371-1372, 1438-1439.)

Verein für Feuerungsbetrieb und Rauchbekämpfung in Hamburg.
Bericht. 1910. 79 p. Il.

Results of numerous steaming tests and investigations of boiler plants with hand-firing and with mechanical stoking.

*[Verein für Feuerungsbetrieb und Rauchbekämpfung in Hamburg.] 600 w. 1905. (In Zeitschrift des Vereines deutscher Ingenieure, v. 49, p. 793-794.)

Report of progress, 1903-1905.

Great Britain

***Coal Smoke Abatement Society.**
Addresses, papers and discussions at Conference on Smoke Abatement, London, Dec. 12-15th, 1905, arranged by the Royal Sanitary Institute and the Coal Smoke Abatement Society. 147 p. [1906.]

***Coal Smoke Abatement Society.**
Papers read at the Smoke Abatement Conferences, March 26-28, 1912. 158 p. Diagrams. [1912.]
Twenty-eight papers with discussions.

***Cohen,** Julius Berend.
A record of the work of the Leeds Smoke Abatement Society. 1,000 w. 1906. (In Journal of the Royal Sanitary Institute, v. 27, p. 71.)

**The same.* 1906. (In Addresses, papers and discussions at Conference on Smoke Abatement, p. 27-29.)

***Committee** for Testing Smoke-Preventing Appliances. Report. 38 p. Ill. 1895.
British committee, owing its origin to the Manchester and Salford Noxious Vapours Abatement Association.
The work of this committee was part of an organized movement to supply trustworthy information on, show the benefits of, and secure smoke abatement. Includes both chemical and mechanical tests. Much of the information has been reduced to the form of tables

***Conference** on smoke abatement. 1905. (In Engineer, London, v. 100, p. 587-589, 612-613, 636-637.)
Reviews proceedings and papers of Conference of 1905, arranged by the Royal Sanitary Institute and the Coal Smoke Abatement Society.

Glasgow. Smoke Abatement Exhibition.
Smoke Abatement Exhibition, comprising appliances for heating, lighting and cooking without smoke. 20 Sept.-12 Oct., 1912. Catalogue and daily programme. 144 p. Ill. 1912.
Organization of exhibit, list of exhibitors, and advertisements.

***International** Smoke Abatement Exhibition, London. 1912. (In Rauch und staub, v. 2, p. 69-70.)
Notes on organization of forthcoming exhibit.

***International** Smoke Abatement Exhibition and Conference, London, 23 März bis 4. April 1912. Spezialbericht für "Rauch und staub." 1912. (In Rauch und staub, v. 2, p. 177-178, 211-222.)
Good abstracts of papers. In German.

***Kershaw,** John B. C.
Glasgow Smoke Abatement Exhibition. 1910. (In Rauch und staub, v. 1, p. 41-43.)
German translation. Discusses scope of exhibition, 16 Sept.-8 Oct., 1910.

***Kershaw,** John B. C.
Manchester Smoke Abatement Exhibition and Conference. Spezialbericht für "Rauch und staub." 1912. (In Rauch und staub, v. 2, p. 98-102.)
In German.

***Kershaw,** John B. C.
Smoke abatement. 3,500 w. Ill. 1906. (In Cassier's magazine, v. 29, p. 335.)

Report on the London Smoke Abatement Conference, Dec. 12-15, 1905. Gives abstracts of papers and brief comment.

***Kershaw,** John B. C.
Smoke abatement in London and Hamburg. 1911. (In Electrical review, London, v. 69, p. 253-255.)

Summarizes reports of smoke abatement organizations of London and Hamburg for 1910.

***Manchester** and Salford smoke-abatement exhibition. 1911. (In Engineering, v. 92, p. 674-675.)

Describes types of stokers and smoke-consuming appliances on exhibition at Manchester, England.

***Manchester Association for the Prevention of Steam Boiler Explosions.**
[Wigan coal trials, 1867-1868.] 1905. (In Cassier's magazine, v. 29, p. 110-111.)

Brief abstract by J. B. C. Kershaw.

***National** Smoke Abatement Institution. 1886. (In Nature, v. 34, p. 203-204.)

Report of Council for 1885, reviewing progress and activities.

***Noxious** Vapours Commission. 1878. (In Chemical news, v. 38, p. 181-182.)

Commission was appointed in 1876. An account is given of its findings as to the damage to vegetation and health from smoke and fumes.

***Official** report of the Committee of the International Smoke Abatement Exhibition, 1882. 1883. (In Chemical news, v. 47, p. 102-104.)

***Report** concerning the Smoke Abatement Exhibition held at South Kensington, London, in 1881. 12 p. Ill. 1882. (In United States—Senate. 47th Congress, 1st session. Executive document 183.)

Sheffield Federated Health Association,** ***pub.
Papers read at the Smoke Abatement Conferences held in the Corn Exchange, Sheffield, March 3rd, 8th and 13th, 1909, with an address delivered by Sir Oliver Lodge at the opening of the Smoke Abatement Exhibiton. 81 p. [1909.]

Eleven papers.

Siemens, Friedrich.
Bericht über die Smoke Abatement Exhibition, London, Winter 1881-82. 136 p. 1882. Springer.

Partly translation from English. Includes "Descriptive catalogue" of exhibition.

**The same, review.* 500 w. 1883. (In Zeitschrift des Vereines deutscher Ingenieure, v. 27, col. 299-300.)

***Simon,** E. D.
Work and policy of the Smoke Abatement League of Great Britain. 1911. (In Proceedings of the Conference of the Smoke Abatement League of Great Britain, Manchester, 21-22 Nov., 1911, p. 9-15.)

Outlines three lines of attack against factory smoke: (1) To help local authorities by securing legislation granting wider powers. (2) To bring pressure to bear on negligent and inefficient authorities. (3) To replace power from coal fuel by electric or gas power.

Smoke abatement. 1884. (In National Health Society's eleventh annual report, 4 March, 1884, p. 26-27.)

Brief report of progress.

***Smoke** abatement. 2,000 w. 1884. (In Engineer, London, v. 58, p. 122.)

Report of Council of the National Smoke Abatement Institution.

***Smoke** abatement. 1896. (In Engineering, v. 62, p. 178-179.)

Editorial review of report of Committee for Testing Smoke-Preventing Appliances.

***Smoke** abatement. 1912. (In Architect and contract reporter, v. 87, p. 201-203.)

Reviews proceedings and results of exhibition of Coal Smoke Abatement Society, March, 1912.

*"**Smoke**-Abatement"-Ausstellung in Glasgow (16 September—8 October, 1910). 500 w. 1910. (In Rauch und staub, v. 1, p. 34.)

***Smoke** abatement conference. 1912. (In Power, v. 35, p. 617-619.)

Abstracts of selected papers read at the International Smoke Abatement Exhibition and Conference, London, March 23-April 4, 1912.

***Smoke** abatement conferences and exhibitions. 1909. (In Cassier's magazine, v. 36, p. 156-159.)

Reviews briefly papers at smoke abatement conference at Sheffield in 1909.

***Smoke** abatement exhibition. 1881. (In Nature, v. 25, p. 121-122.)

Describes some of devices exhibited.

***Smoke** abatement exhibition. 1881-1882. (In Architect, v. 25, p. 399; v. 27, p. 102, 168, 378; v. 28, p. 12, 51.)

Short articles giving list of awards, and discussing organization and scope of exhibition at South Kensington.

***Smoke** abatement exhibition. 1882. (In Nature, v. 25, p. 219-221.)

Briefly describes some of appliances exhibited for doing away with smoke; mainly for domestic use.

***Smoke Abatement League of Great Britain.**

Proceedings of Conference held at Manchester, November 21 and 22, 1911. 124 p. Ill. n. d.

***Smoke** Abatement League of Great Britain zweite jahresversammlung am 21. November 1911. 350 w. 1912. (In Rauch und staub, v. 2, p. 103.)

Scope and organization.

***Work** of the Smoke Abatement Committee. 1882. (In Journal of gas lighting, v. 41, p. 262-264.)

Reviews report of Smoke Abatement Committee of 1882, consisting largely of tests of fuels and apparatus by D. K. Clark.

United States

***Engineers' Club of Philadelphia.**

Smoke prevention; a discussion by members and visitors. October 1, 1910. 1911. (In Proceedings of the Engineers' Club of Philadelphia, v. 28, p. 52-67.)

Discussion by D. T. Randall, Joseph S. Neff, James Christie, E. M. Nichols, Howard S. Anders, John M. Lukens, and Henry Leffmann.

Consideration of general features of the smoke problem, with some attention to conditions in Philadelphia.

***Engineers' Club of St. Louis**—Special Committee on Smoke Prevention.

Report. 42 p. 1892. (In Journal of the Association of Engineering Societies, v. 11, p. 291.)

**The same, condensed.* (In Engineering and mining journal, v. 54, p. 124.)

**The same, condensed.* (In Railroad gazette, v. 24, p. 246-248.)

**The same, condensed.* (In Engineering record, v. 26, p. 167.)

Importance of smoke prevention; principles of combustion; fuels and conditions of fuel consumption in St. Louis; experience in other cities; essentials of smoke abatement devices; classification of types and the principles on which they depend; conclusions and recommendations.

***Engineers' Society of Western Pennsylvania**—Committee on Smoke Prevention.

Report of the Committee on Smoke Prevention. 1892. (In Proceedings of the Engineers' Society of Western Pennsylvania, v. 8, p. 299-323.)

Brief history of smoke prevention, and discussion of causes of smoke and methods of prevention. Gives ordinances of Chicago, Cincinnati, Cleveland and Birmingham, England, and a proposed ordinance for Pittsburgh.

***Engineers' Society of Western Pennsylvania**—Committee on Smoke Prevention.

Report of the Committee on Smoke Prevention. 1899. (In Proceedings of the Engineers' Society of Western Pennsylvania, v. 15, p. 235-238, 298-306, 308-318.)

Discussion of proper heating-surface and grate-surface per horsepower for boilers, and methods of firing to prevent smoke.

"Best method of preventing smoke is to burn the fuel in a separate chamber, so that the combustion is complete, before the gases touch the surface of the boiler." Conclusions, p. 237.

***Pittsburgh, Chamber of Commerce.**

Report of Special Committee on Smoke Prevention. 11 p. 1899.

**The same.* (In Yearbook and directory of the Chamber of Commerce of Pittsburgh, Pa., 1900, p. 59-69.)

Urges abatement of smoke as a practicable measure. Outlines essentials for smokeless combustion of bituminous coal.

***Pittsburgh, Chamber of Commerce.**

What has the Chamber of Commerce done? [19 p. 1909.]

"Smoke abatement," p. [9.]

***Smoke Abatement League of Hamilton County, Ohio.**

Annual report. 1909-1911.

Report by Supt. Edward S. Jerome. League was formed in 1906. Report for 1909 is typewritten copy.

Inspection. Enforcement of Ordinances

See also Observation and measurement.

***Bird, Paul P.**

City supervision of new boiler plants. 1908. (In Industrial world, v. 83, p. 851-852.)

Describes Chicago's policy of allowing only officially approved installations.

***Chicago**—Department of Smoke Inspection.
Report. 149 p. Ill. 1911.

History, organization and policy, with a discussion of economic problems and of the chief industrial sources of smoke.

***Chubb,** Lawrence W.
Powers and duties in the matter of smoke abatement. 4,000 w. 1906. (In Journal of the Royal Sanitary Institute, v. 27, p. 230.)

**The same.* 1906. (In Addresses, papers and discussions at the Conference on Smoke Abatement, p. 132-139.)

Summarizes British practice and urges authorities to take a decided stand. Asks for a simplification and extension of the law and increased power of enforcement for local boards.

***Chubb,** Lawrence W.
Smoke abatement. 1909. (In Papers read at the Smoke Abatement Conferences at Sheffield, March, 1909, p. 35-41.)

Explains difficulties in the way of enforcement of law regarding smoke emission and suggests method of procedure.

***Cleveland**—Municipal Committee on the Smoke Nuisance.
Report of the Municipal Committee on the Smoke Nuisance. Adopted by the Cleveland Chamber of Commerce, March 19, 1907. 14 p. 1907.

Considers question from the mechanical side and from the viewpoint of economy. Recommends: Enforcement of prohibitory ordinance "after a reasonable length of time;" appointment of inspectors to supervise existing plants and approve new installations; development of information bureau; educational campaign among manufacturers, and prosecution for repeated violations.

***Cleveland Chamber of Commerce.**
Report of the Committee on Smoke Prevention, presented Nov. 16th, 1909. 13 p. [1909.]

Recommends an information bureau for advisory work and favors vigilance in inspection and rigid enforcement of ordinances.

***Crusade** in New York City. 1913. (In Industrial world, v. 92, n. s. v. 47, p. 141.)

Notes on proposed vigorous campaign, prosecuting all violators of smoke provisions of the Sanitary Code.

***Cushing,** George H.
Practical campaign for smoke prevention. 1908. (In American review of reviews, v. 38, p. 62-66.)

Plans of smoke inspectors of Chicago giving special attention to the installation and type of proper firing equipment.

***Dee,** T. G.
Smoke abatement from the sanitary inspector's point of view. 1,200 w. 1906. (In Journal of the Royal Sanitary Institute, v. 27, p. 238.)

**The same.* 1906. (In Addresses, papers and discussions at the Conference on Smoke Abatement, p. 140-143.)

Reviews important patents on typical preventive devices. Shows that the definition of a nuisance resulting from black smoke depends on two factors, the density of the smoke and the duration of the emissions.

Great Britain—House of Commons.
Returns of the number of prosecutions in the Metropolitan Police Courts under the Smoke Nuisance Abatement (Metropolis) Act: Amount of fines imposed; &c. 1 p. 1855. 1854-55 (270.) LIII, 355.

Great Britain—House of Commons.
Return of the number of smoke consuming furnaces in each police district of the Metropolis not including the City of London; of the regulations . . . for enforcing the provisions of the Smoke Act; of the number of convictions; of the number of persons employed as examiners of furnaces; and of the number of apparatuses sanctioned by such examiners as efficient smoke consumers. 3 p. 1861. (550.) L, 761.

Great Britain—House of Commons.
Smoke; copy of a letter addressed by the Secretary of State to the Mayors or local authorities in certain large towns in England, on the subject of the law in force in such towns with respect to the consumption of smoke, with the substance of the answers thereto. 3 p. 1866. (218.) LX, 463.

Tabulated data on 18 English cities and towns outside London, showing enactments; how long enactments have been in force; extent of application to industries; means of enforcement; number of convictions, and effect on diminution of smoke nuisance. Nearly all report improved conditions.

Great Britain—House of Commons.
Smoke Nuisance Acts; copy of correspondence between the Duke of Westminster and the Secretary of State for the Home Department on the defective administration of the Smoke Nuisance Act in the Metropolis, together with the analysis prepared by the Smoke Abatement Institute of the fines imposed in the Metropolitan Police Court. 6 p. 1883.

***Kuss**, Robert H.
City supervision of new boiler plants. 1908. (In Engineering record, v. 58, p. 36-38.)

Discussion at convention of International Association for the Prevention of Smoke.

Describes practice followed in Chicago and gives rules for construction of furnaces to meet requirements of Smoke Department.

***Kuss**, Robert H.
Service of a well-organized city smoke department. 1908. (In Industrial world, v. 83, n. s. v. 42, p. 1120-1123.)

Describes work of Chicago Department, discussing supervision of fuel-burning plants.

***Milwaukee**—Smoke Inspector.
Annual report of the Smoke Inspector, City of Milwaukee, Wisconsin, for the year 1911. 16 p. 2 ill. 1911.

Gives statistics and brief explanation concerning the work done by the Department.

***Monnett**, Osborn.
Chicago's record for the year 1912. Diag. 1913. (In Industrial world, v. 92, n. s. v. 47, pt. 1, p. 131-132.)

Series of comparisons by City Smoke Inspector; coöperation by railroads. Average of about 20 plants per month reconstructed.

*"**New** deal" for Cleveland on smoke. 1913. (In Industrial world, v. 92, n. s. v. 47, pt. 1, p. 134, v-xi, xx, advertising section.)

Comment on Cleveland Smoke Inspector's report for 1912, with abstract of report.

***New** smoke-inspection methods at Chicago. 1912. (In Power, v. 36, p. 202.)

Total smoke emitted during day to be observed, rather than maximum density for short periods.

***New York** City's smoke. 1912. (In Power, v. 36, p. 307.)

Editorial, suggesting smoke inspection work by city authorities, in line with that of Chicago.

***Nicholson,** William.

Smoke abatement from the inspector's point of view. 1912. (In Papers read at the Smoke Abatement Conferences, March . . . 1912, p. 76-80.)

Aims to show by experience of Sheffield that "prevention of coal smoke is both practicable and profitable." Considers especially metallurgical and domestic smoke.

***Nicholson,** William.

Smoke nuisance inspectors and their difficulties. 500 w. 1906. (In Journal of the Royal Sanitary Institute, v. 27, p. 242.)

**The same.* 1906. (In Addresses, papers and discussions at the Conference on Smoke Abatement, p. 144-145.)

Claims that a board of experts is necessary to determine what is and what is not a statutory nuisance.

***Priestley,** Joseph.

The smoke nuisance and the medical officer of health. 1,500 w. 1900. (In Journal of the Sanitary Institute, v. 21, p. 62.)

Deals principally with British law on the subject.

***Rebs.**

Polizeiliche massnahmen gegen rauch und russ in Dresden. 1904. (In Zeitschrift des Vereines deutscher Ingenieure, v. 48, pt. 1, p. 388-389.)

Address before Dresdner Bezirksverein.

***Roberts,** E. P.

"100 per cent. efficiency in smoke abatement;" the province of the smoke inspector. 1913. (In Industrial world, v. 92, n. s. v. 47, pt. 1, p. 141-142.)

By Chief Smoke Inspector, Cleveland, O.

Sheffield—Medical Officer of Health.

Annual report for the year 1901.

"Black smoke nuisance," p. 75-81.
Gives statistics of work done by smoke inspectors for previous 10 years.

***Smoke** and the Alkali Act. 1,200 w. 1890. (In Engineer, London, v. 69, p. 462.)

Editorial, reviewing report of Chief Inspector of Alkali Works, and calling attention to needed enforcement of regulations.

***Tighe,** William, *Inspector.*

Smoke abatement. Issued by the Department of Smoke Inspection, Toledo, Ohio. [2 p.] n. d.

Leaflet urging personal effort on part of manufacturers and general public.

Smoke Problem in Special Localities

Europe

Ascher, Louis.

Rauchbekämpfung in England und Deutschland; ein reisebericht. 1907. (In Deutsche vierteljahrsschrift für öffentliche gesundheitspflege, v. 39, p. 291-300.)

"Literatur," p. 299-300.

Ascher's bibliography (15 references) relates mainly to individual papers at "Conference on Smoke Abatement," London, 1905, and other British papers.

Reich, F.

Ueber die bei aussersächsischen hüttenwerken beobachteten wirkungen des hüttenrauches und die dagegen ergriffenen massregeln. 1867. (In Jahrbuch fur den berg- und hütten-mann auf das jahr 1867, p. 129.)

Report of trip to investigate conditions in various parts of England and Continental Europe. About 40 plants were visited, and effect on adjacent region observed. Gives many references to literature of fume control.

France

***Bach,** C.

Zum stand der frage der rauchbelästigung durch dampfkesselfeuerungen in der stadt Paris. 1899. (In Zeitschrift des Vereines deutscher Ingenieure, v. 43, pt. 1, p. 68-70.)

Briefly describes six devices awarded prizes by a Paris commission for the best means for preventing smoke. Tests were made by the commission.

Fumées de Paris. 1901. (In Génie civil, v. 39, p. 77-79.)

Concerned particularly with pollution of city air, giving analyses showing harmful gases present.

Germany and Austria

***Ascher,** Louis.

Rauchbekämpfung in Königsberg i. Pr. 1911. (In Rauch und staub, v. 1, p. 219-221.)

Describes experiences and methods in combating smoke in Königsberg.

***Aus** dem sächsischen Manchester. 1911. (In Rauch und staub, v. 1, p. 360-361.)

Discussion of the industries of Chemnitz, the resultant air contamination and its effects.

***Entwicklung** der hüttenrauchfrage auf den staatlichen hüttenwerken bei Freiberg in Sachsen. 1910. (In Rauch und staub, v. 1, p. 80.)

From Kochinke's "Zum 200 jahrigen bestehen der staatlichen hüttenwerke bei Freiberg in Sachsen." 1910.

***Hauser,** K.

Aus der praxis der rauchbekämpfung. 1912. (In Rauch und staub, v. 2, p. 113-115.)

Conditions in Munich. Urges popular education in smoke prevention as hygienic measure.

Lewicki, J. L.
Bericht über rauchfreie dampfkessel-anlagen in Sachsen. Calorimetrische untersuchungen ausgeführt mit unterstützung des Königlichen Ministeriums des Innern, im auftrag und unter beihülfe des sächsischen Ingenieur- und Architekten-Vereins, von dem berichterstatter J. L. Lewicki. 206 col. Ill. Atlas zum bericht, 21 pl. 1896. Leipzig. A. Felix.

**The same, review and abstract, by F. Haier.* 1 diag. 1897. (In Zeitschrift des Vereines deutscher Ingenieure, v. 41, p. 461-464, 484-489.)

Report to Minister of the Interior is reviewed at considerable length, giving important conclusions and showing performance of a variety of furnaces and fuels.

Merbach, Kurt.
Die anlagen zur unschädlichkeitmachung des rauches auf den fiskalischen hüttenwerken bei Freiberg. 4 folding pl. 1881. (In Jahrbuch für das berg- und hüttenwesen im Königreiche Sachsen auf das jahr 1881, pt. 1, abhandlungen, p. 42-49.)

Plates show graphically the comparative control of fumes for long periods.

***Meter,** Eduard.
Die rauchplage und ihre bekämpfung. 2,000 w. 1905. (In Zeitschrift des Oesterreichischen Ingenieur- und Architekten-Vereines, v. 57, pt. 2, p. 424.)

Conditions in Vienna.

Nussbaum, H. Chr.
Rauchbelästigung in deutschen städten. 1900. (In Deutsche vierteljahrsschrift für öffentliche gesundheitspflege, v. 32, p. 562-566.)

Brief summary based in part on inquiry addressed to 250 towns, 187 of which responded.

*Prevention of smoke in Berlin. 100 w. 1911. (In Engineering and mining journal, v. 91, p. 335.)

**The same, translated.* 1911. (In Rauch und staub, v. 2, p. 268.)

Quotes Consul Thackara in statement that comparative absence of smoke in Berlin is due largely to use of coke and to brown-coal briquets without special binders. These briquets form very little smoke; they constitute 30% of the coal fuel used in the city.

***Rambousek.**
Ueber die rauchfrage in Karlsbad. 2 dr. 1912. (In Rauch und staub, v. 2, p. 183-186.)

Discusses general conditions and shows firing systems of Tischler, Mattern and Sichert.

***Rasch,** Hermann.
Der schutz der nachbarschaft gewerblicher anlagen in Hamburg. 68 p. 1911. Druckerei-Ges. Hartung & Co.

**The same, abstract,* 1911. (In Rauch und staub, v. 2, p. 63-65.)

**The same, review.* 1911. (In Rauch und staub, v. 2, p. 77-78.)

Considers hygienic conditions in many different industries, discussing smoke and dust very briefly.

***Rauch-** und russbelästigung. 150 w. 1912. (In Rauch und staub, v. 2, p. 134.)

Abstract from "Wiesbadener tagblatt," 23 Dec., 1911.
Mentions specific instances of smoke nuisance in Wiesbaden.

***Storch.**
[Wirtschaftlichkeit und rauchverhütung im betrieb von dampfkesselfeuerung, 1906.] (In Zeitschrift des Vereines deutscher Ingenieure, v. 50, pt. 2, p. 1755-1756.)

Abstract of address before Bergischer Bezirksverein.

Relation between smoke and fuel economy, considering Westphalian coal, and discussing local smoke abatement work.

Great Britain

***Booth,** William Henry.
Smoke prevention in London. 1906. (In Power, v. 26, p. 567.)

Brief general letter, referring to design for a furnace.
See also p. 163.

***Des Vœux, H. A.**
Plea for a Royal Commission. 1912. (In Papers read at the Smoke Abatement Conferences, March . . . 1912, p. 140-144.)

States reasons for desirability of Royal Commission to investigate smoke question and outlines scope of advisable inquiry. Considers Act of 1875 a failure.

***Des Vœux, H. A.**
Ten years' work of smoke abatement in London 1909. (In Papers read at the Smoke Abatement Conferences at Sheffield, March, 1909, p. 64-72.)

Reviews success of work along lines of enforcement of existing laws, investigation of causes of smoke nuisance, etc.

Great Britain.
Copy of a letter addressed to Her Majesty's Secretary of State for the Home Department by the General Board of Health, dated 20th July, 1854, with a digest of the information obtained with regard to the operation of inventions for the consumption of smoke. 29 p. 1855. 1854. [1854.] LXI, 533.

Extensive investigations undertaken at request of Viscount Palmerston.

Great Britain—House of Commons.
Report from the Select Committee of the House of Lords on Smoke Nuisance Abatement (Metropolis) Bill [H. L.]; together with the proceedings of the Committee and minutes of evidence. 49 p. 1887. (321.) XII, 265.

Great Britain—House of Commons.
Report from the Select Committee on Smoke Prevention together with minutes of evidence, appendix and index. 239 p. Ill. 1843. (583.) VII, 379.

Great Britain—House of Commons.
Report from the Select Committee on Smoke Prevention; together with the minutes of evidence, appendix and index. 72 p. 1 pl. 1845. (289.) XIII, 539.

Reports that "opaque smoke issuing from steam-engine chimneys may be so abated as no longer to be a public nuisance."

Great Britain—House of Commons.
Report from the Select Committee on Steam Engines and Furnaces, &c. 9 pl. 24 p. 1819. 1819. (574.) VIII, 271.

Testimony shows that in Liverpool smoke nuisance has almost entirely risen during preceding 20 years.

Great Britain—House of Commons.
Report from the Select Committee on Steam Engines and Furnaces; &c. 17 p. 1820. (244.) II, 235.

Fifteen witnesses examined gave testimony generally favorable to practicability of smoke abatement.

Great Britain—House of Commons.
Second report from the Select Committee on Smoke Prevention; together with the minutes of evidence and appendix. 37 p. 1845. (489.) XIII, 621.

***Kershaw**, John B. C.
Coal smoke abatement in England, 1. (London.) 1910. (In Rauch und staub, v. 1, p. 10-12.)

Translated into German.

***Kershaw**, John B. C.
Ein neues stadium der rauchbekämpfung in England. 1911. (In Rauch und staub, v. 1, p. 314-315.)

Review of progress made in smoke abatement education.

***Kershaw**, John B. C.
Notes on recent progress in the campaign against black smoke in the United Kingdom. 1912. (In Papers read at the Smoke Abatement Conferences, March . . . 1912, p. 68-75.)

Shows by meteorological data that progress is being made, and reviews educational and other work that has been carried on.

***Kershaw**, John B. C.
Smoke abatement. 1911. (In Nineteenth century and after, v. 70, p. 1162-1177.)

Considers subject under headings of the present state of the law in London and the provinces; practical aspects of smoke abatement; work of voluntary agencies, and the line of future progress.

***Kershaw**, John B. C.
Smoke abatement in Great Britain. 1911. (In Power, v. 34, p. 918-920.)

Briefly reviews papers read and devices shown at smoke-abatement conference and exhibition at Manchester, England, Nov. 10-25, 1911.

***Marten**, Henry J.
Smoke abatement. 1889. (In Transactions of the Sanitary Institute, v. 10, p. 189-192.)

Considers magnitude of smoke evil in London, with statistics of coal consumption and smoke production.

***Preece**, William H.
Factory and trade smoke abatement. 1,800 w. 1906. (In Journal of the Royal Sanitary Institute, v. 27, p. 137.)

**The same*. 1906. (In Addresses, papers and discussions at the Conference on Smoke Abatement, p. 65-69.)

Contrasts in a general way the conditions in London with those elsewhere. Little reference to subject indicated in the title.
Discussion. 4,800 w. p. 175.

***Smoke** abatement. 1884. (In Saturday review, v. 58, p. 115.)

Brief editorial on increased efforts toward smoke prevention in London. Discusses status of movement in England (1884) as fostered by associations, legislation and public sentiment.

Holland

***Kuyser,** J. de.
Fünfter jahresbericht der "Vereeniging tot bevordering van rookvrij stoken" zu Amsterdam. 1913. (In Rauch und staub, v. 3, p. 185.)

***Kuyser,** J. de.
Rauchbekämpfung in den Niederlanden. Bericht der "Vereeniging tot bevordering van rookvrij stoken" zu Amsterdam über das jahr, 1910.
Abstract of third annual report.

***Kuyser,** J. de.
Vierter jahresbericht der "Vereeniging tot bevordering van rookvrij stoken" zu Amsterdam. 350 w. 1912. (In Rauch und staub, v. 2, p. 178.)
Abstract, showing progress in Holland in 1911.

Russia

***Schmähling,** G.
Bewegung gegen rauch und staub in den Ostseeprovinzen, speziell in Riga. 1912. (In Rauch und staub, v. 2, p. 115-118.)
Partial report on investigation of smoke abatement in Russia.

South America

***[Medinger,** Hans von.]
Bekämpfung der rauch- und staubplage in Südamerika. 200 w. 1912. (In Rauch und staub, v. 3, p. 122.)
Abstract from "Mitteilungen der Oesterreichischen Gesellschaft zur Bekämpfung der Rauch- und Staubplage," 1912, no. 7.

United States

Chicago

***American Society of Mechanical Engineers.**
What is the present status in Chicago of the question of smoke preventing furnaces under steam boilers? 3,200 w. 1886. (In Transactions of the American Society of Mechanical Engineers, v. 7, p. 788-797.)
Topical discussion indicating but slight progress.

***Bird,** Paul P.
Chicago's smoke problem. 12 ill. 1910. (In Journal of the Western Society of Engineers, v. 15, p. 279-345.)
General paper, briefly outlining working policy and methods of the Smoke Abatement Commission. Extensive discussion follows.

***Bird,** Paul P.
Prevention of smoke in Chicago. 1908. (In Railway and engineering review, v. 48, p. 1044-1045.)
Condensed from lengthy report by author as Chicago Smoke Inspector.

***Bird,** Paul P.
Smoke prevention. 1911. (In Transactions of the American Society of Heating and Ventilating Engineers, v. 17, p. 216-228.)

Discussion, p. 228-234.
Author is (1911) Smoke Inspector of Chicago, and both paper and discussion deal largely with conditions in that city. Computations show that railroads produce 43% of Chicago's smoke, and stationary steam power plants 30%, while the next largest producers are respectively the industrial furnaces (other than steam producers) and the heating plants in the central district. River craft make 4% and the flats and domestic heating plants only 4½%.

***Chicago** smoke question. 120 w. 1910. (In Iron trade review, v. 47, p. 284.)

**The same, translated.* 1910. (In Rauch und staub, v. 1, p. 26.)
Brief statement, comparing Chicago unfavorably with European cities.

***Donnelly,** Thomas E.
Smoke abatement in Chicago. 1912. (In Papers read at the Smoke Abatement Conferences, March . . . 1912, p. 51-58.)
Gives methods used by commission, showing that smoke abatement is a matter not of legislation but of engineering and administration.

***Monnett,** Osborn.
New methods of approaching the smoke problem. 7 diag. 1912. (In Journal of the Western Society of Engineers, v. 17, p. 1011-1029.)
Discussion, p. 1029-1048.

**The same, condensed.* (In Canadian engineer, v. 24, p. 190-191.)

**The same, condensed.* (In Engineering record, v. 66, p. 515.)

**The same, condensed.* (In National engineer, v. 16, p. 720-721.)

**The same, condensed.* (In Railway age gazette, v. 53, p. 1047-1048.)
Outlines methods followed by Chicago Smoke Department, use of smoke charts and handling data on smoke production by railroads. Author is (1912) Chief Smoke Inspector of Chicago.

***Rauchbekämpfung** in Chicago. 1913. (In Rauch und staub, v. 3, p. 202-203.)
Abstract from "Zeitung des Vereins deutscher Eisenbahnverwaltungen," 1913, no. 21, p. 356.
Outline of recent progress.

***Schultze,** Ernst.
Der kampf gegen den rauch in Chicago. 1910. (In Rauch und staub, v. 1, p. 72-74.)
Based on Chicago official reports.

***Smoke** abatement at Chicago. 1913. (In Railway master mechanic, v. 37, p. 180-181.)
Special attention to smoke from railways.

***Smoke** abatement in Chicago. 1908. (In Engineering news, v. 59, p. 669-670.)
Gives steps advocated at a smoke abatement meeting of representatives of various organizations.

***Smoke** abatement methods and progress in Chicago. 1911. (In Engineering record, v. 63, p. 426-427.)
Reviews important features of the comprehensive report of the Department of Smoke Inspection.
See also article, p. 447.

The **Smoke** crusade. 1892. (In Stationary engineer, v. 11, p. 256.)
Results in Chicago; mainly work of Society for the Prevention of Smoke.

***Smoke** nuisance. 1908. (In Outlook, New York, v. 90, p. 53-54.)

Editorial attention to anti-smoke activities, especially in Chicago.

Smoke nuisance again. 1892. (In Stationary engineer, v. 11, p. 36-37.)

Conditions in Chicago.

Cleveland

***Benjamin,** Charles H.

Smoke abatement in Cleveland. 2,300 w. Ill. 1902. (In American machinst, v. 25, pt. 1, p. 131.)

Describes satisfactory progress and outlines methods by which the improved conditions were secured. Appliances are not described.
Editorial comment, p. 135.

***Benjamin,** Charles H.

Smoke abatement in large cities. 1902. (In Outlook, New York, v. 70, p. 480-483.)

**The same, condensed.* (In Current literature, v. 32, p. 419-420.)

Deals mainly with method of operation of the Cleveland department of smoke inspection.

Benjamin, Charles H.

Smoke and its abatement. How a live western city settled the smoke nuisance. Description of the department and its methods. 1905. (In Municipal journal and engineer, v. 19, p. 64-66.)

Paper before A. S. M. E. at Scranton, Pa.
By Superintendent of Smoke Prevention Department of Cleveland, Ohio. Refers only very briefly to work there, but says that "damage inflicted by soft coal smoke in a city like Pittsburg or Cleveland . . . probably amounts to hundreds of thousands of dollars annually."

***Benjamin,** Charles H.

The smoke from a great city; some practical experience with preventive measures. 3,500 w. Ill. 1901. (In Cassier's magazine, v. 20, p. 129.)

Satisfactory progress in dealing with the smoke problem in Cleveland, Ohio.

***Principles** and practices in smoke abatement in Cleveland. 1913. (In Industrial world, v. 93, n. s. v. 47, p. 594-595.)

Abstract of pamphlet prepared by Chief Smoke Inspector, E. P. Roberts.

***Roberts,** E. P.

Smoke prevention in Cleveland. 100 w. 1913. (In Science, v. 60, n. s. v. 37, p. 571.)

Abstract of paper before the American Association for the Advancement of Science.

Pittsburgh

***Benner,** Raymond C.

Lectures on the smoke problem. 1912. (In Science, v. 59, n. s. v. 36, p. 45-46.)

Announcement of lecture subjects on various features of the smoke problem, by lecturers from Industrial Research Department of University of Pittsburgh.

***Benner,** Raymond C.

Research on the smoke problem at the Department of Industrial Research of the University of Pittsburgh. 1912. (In Science, v. 58, n. s. v. 35, p. 977-979.)

***Benner,** Raymond C.
Smoke abatement in Pittsburgh. 1912. (In Papers read at the Smoke Abatement Conferences, March . . . 1912, p. 81-83.)
Shows nature and scope of work at University of Pittsburgh.

***Benner,** Raymond C.
Smoke investigation. 200 w. 1912. (In Engineering and mining journal, v. 93, p. 394.)
Letter dated 15 Feb., 1912, outlining scope of smoke problem investigation at University of Pittsburgh.

***Benner,** Raymond C.
Die wissenschaftliche erforschung der rauchfrage durch das "Department of Industrial Research" der Universität Pittsburgh, U. S. A. 1912. (In Rauch und staub, v. 2, p. 308-309.)
Brief résumé of work at Research Laboratory of the University of Pittsburgh.

***Haskin,** Frederic J.
Smoke nuisance. The Pittsburgh investigation. 1912. (In Citizens' bulletin, Cincinnati, v. 10, 7 Dec., 1912, p. 1, 3.)

***Holdsworth,** J. T.
The smoke problem. [1912.] (In his "Report of the economic survey of Pittsburgh," p. 31-45.)
Report to Mayor and Council. A general survey of economic conditions in Pittsburgh, and a rather detailed study of certain factors affecting the city's prosperity, with recommendations for industrial betterment.
"The smoke nuisance is here set down frankly and unreservedly as the greatest hindrance to Pittsburgh's economic progress." Page 31.

***Jerome,** Edward S.
An investigation. One that means something. 1912. (In Citizens' bulletin, Cincinnati, v. 10, 16 Nov., 1912, p. 6.)
Investigation at University of Pittsburgh.

***O'Connor,** John, *jr.*
Smoke investigation of the University of Pittsburgh. 1913. (In Industrial world, v. 92, n. s. v. 47, pt. 1, p. 132-133.)
Outlines scope of investigation under Dr. R. C. Benner, Industrial Research Department, University of Pittsburgh.

***Pittsburgh.** University.
University of Pittsburgh. Department of Industrial Research. Outline of the smoke investigation. Bulletin no. 1, August, 1912. 16 p. 1912.
In 1911 a fund was provided by a Pittsburgh business man, for investigation of the smoke nuisance with special reference to local conditions. This bulletin outlines scope of the investigation. It is proposed to issue other bulletins in this series, dealing with the following subjects: Mechanical engineering phases of the smoke investigation; Legal aspects of the smoke problem; Economic cost of the smoke nuisance to Pittsburgh; Smoke and health; Smoke and the weather; Psychological effects of smoke and soot; Formation of smoke particles, and the various methods of their separation from the containing gas.

***Pittsburgh** and smoke prevention. 1913. (In Industrial world, v. 47, p. 48.)
Editorial mention of work being carried on in Pittsburgh.

***[Scrap books.]** 4 v.
v. 1-2. [Clippings from Pittsburgh newspapers, for the publication of which the Smoke Investigation was either directly or indirectly responsible.] 1912-1913.
v. 3. [Clippings from 80 cities, including Pittsburgh.] 124 p. 1912-1913.

*[**Scrap** books]—*continued.*

v. 4. [Clippings from 112 cities, including Pittsburgh.] 250 p. 1912-1913.

***Searle,** J. M.

Coal smoke and its practical abatement. 24 p. 1912.

**The same.* 1912. (In Proceedings of the Engineers' Society of Western Pennsylvania, v. 28, p. 459-487.)

Discussion, p. 487-498.

Discusses principles and practice of combustion without smoke, and notes evidences of progress in Pittsburgh district.

***Searle,** J. M.

The year's (1912) labor for smoke prevention in the City of Pittsburgh. 350 w. 1913. (In Industrial world, v. 92, n. s. v. 47, pt. 1, p. 129.)

Total of 1,255 abatements in city proper in 1912. Railroads promise smokeless locomotives inside city limits by April, 1914.

***Sims,** Mirabeau.

Smokeless combustion of bituminous coal in the Pittsburgh district. 1911. (In Proceedings of the Engineers' Society of Western Pennsylvania, v. 27, p. 452-464.)

Partial bibliography, compiled by Technology Department of the Carnegie Library of Pittsburgh, p. 462-464. (17 references with annotations.)

Discussion, p. 464-494, by J. A. Hunter, D. F. Crawford, D. P. Morrison, W. E. Snyder, W. G. Wilkins, S. B. Flagg, I. W. Frank, H. C. Porter, C. E. Augustine.

Correspondence, 4 ill., p. 495-502, by E. D. Dreyfus, B. F. Burman.

Author considers fuel economy a strong argument for smoke abatement. Advocates forced draft and mechanical stoker on underfeed principle.

***Smoke** investigators are hard at work. 1913. (In Pitt weekly, v. 3, p. 8.)

Outlines extent and organization of investigation in the Industrial Research Department of the University of Pittsburgh.

***Veditz,** C. W. A.

Tentative outline for an investigation into the economic phases of the smoke problem. 1912. (In Papers read at the Smoke Abatement Conferences, March . . . 1912, p. 84-87.)

Outlines economic investigation instituted at University of Pittsburgh. General study of its effect on cost of living.

Miscellaneous

***Bretherton,** S. E.

Smoke nuisance in California. 1910. (In Engineering and mining journal, v. 90, p. 152-153.)

**The same, note, translated.* 40 w. 1910. (In Rauch und staub, v. 1, p. 26.)

Letter on damage to forests and crops by smelter smoke. Mentions government interference and claims that present (1910) efforts at abatement have minimized the really serious damage. States that pines are much more susceptible than deciduous trees.

***Bryan,** William H.

Smoke abatement in St. Louis. 6,000 w. Ill. 1901. (In Journal of the Association of Engineering Societies, v. 27, p. 215.)

**The same, condensed.* (In Iron age, v. 69, Feb. 13, p. 8-12.)

Progress in dealing with the smoke problem. Ordinances are given and typical preventive devices described.

***Jerome,** Edward S.
Smoke abatement. What one great establishment has done. 1912. (In Citizens' bulletin, Cincinnati, v. 10, 23 Nov., 1912, p. 2.)

Improved conditions at plant of Fleischmann Co., Riverside (Cincinnati.) No technical data.

***Massachusetts**—Sanitary Commission.
Report of a general plan for the promotion of public and personal health, devised, prepared and recommended by the Commissioners appointed under a resolve of the Legislature of Massachusetts, relating to a sanitary survey of the state. 1850.

"Abatement of the smoke nuisance," p. 218.
Report is devoted largely to outlining a plan for a sanitary survey of the state, enumerating under fifty heads the various measures proposed. Number 41 deals briefly with abatement of the smoke nuisance, recommending "that measures be taken to prevent, as far as practicable, the smoke nuisance." Cites success of experiments in England showing that it is "economical and practical" to "burn up the smoke as fast as produced." Gives no technical information. A foot-note quotes from "Liverpool Health of Towns Adv."

***Nelson,** Matthew.
Smoke abatement in Cincinnati. 1910. (In American city, v. 2, p. 8-10.)

Considers progress that has been made.

***Parsons,** Payn B.
Smoke problem; with some special applications to New York City. 1 dr. 7 ill. 1911. (In "Municipal chemistry," ed. by Charles Baskerville, p. 322-336.)

Concise summary of the evils of smoke, extent of the nuisance in New York City and present (1911) status of smoke prevention.

***Rauchverminderung** in Boston. 450 w. 1912. (In Rauch und staub, v. 2, p. 334.)

Notes based on report of "Gas and Electric Light Commission," 1911.

***Rutherford,** Payne.
Louisville department finds a need for a smoke consumer for low pressure boilers. 1913. (In Industrial world, v. 92, n. s. v 47, pt. 1, p. 141.)

Brief notes and statistics by City Smoke Inspector of Louisville, Ky.

***Scientific** smoke prevention in Boston. 1911. (In Engineering record, v. 63, p. 657-658.)

Reviews work accomplished and methods successfully used. Ringelmann charts were used in establishing density of smoke.

***Smoke** abatement. 900 w. 1902. (In Engineering magazine, v. 22, p. 924.)

Editorial review of papers by Bryan and Benjamin dealing respectively with conditions in St. Louis and Cleveland.

***Smoke** abatement. 1907. (In Bulletin of the League of American Municipalities, v. 7, p. 7-10.)

Gives information as to attempts at smoke abatement in St. Louis, New York, Indianapolis, Baltimore, Chicago and Milwaukee.

***Smoke** abatement at Indianapolis. 1905. (In Engineering news, v. 54, p. 348.)

Gives brief notice of methods successfully followed by smoke inspector.

***Smoke** abatement in Boston. 800 w. 1911. (In Municipal journal and engineer, v. 30, p. 890.)

Review of progress in six months under new state law (1911).

***Smoke** abatement work by Minneapolis Civic and Commerce Association. 1913. (In Industrial world, v. 92, n. s. v. 47, pt. 1, p. 148, 159-160.)

From advance copy of smoke abatement section of annual report of the Minneapolis Civic and Commerce Association for 1912. Year's work includes over 775 inspections from 385 of which records were obtained; receipt of 97 letters of complaint; sending of 121 letters to violators; 21 cases of arrest with imposition of fine in each case.

***Smoke** evil in Memphis. An address issued by the new City Commission. Abatement to date highly gratifying. 250 w. 1913. (In Industrial world, v. 92, n. s. v. 47, pt. 1, p. 148.)

Notes on abatement campaign in Memphis, Tenn.

***Smoke** law that works. How Boston is succeeding where many cities have failed. 3 ill. 1911. (In New England magazine, v. 50, p. 126-130.)

Much attention is given to instructions to firemen. Unique feature of law is its classification of stacks according to their inside diameters.

***Smoke** nuisance and its regulation with especial reference to the condition prevailing in Philadelphia—Improved furnaces and mechanical stokers. 122 p. Ill. 1897-98. (In Journal of the Franklin Institute, v. 143, p. 393; v. 144, p. 401; v. 145, p. 1, 107.)

Lengthy discussion of smoke preventive appliances before Franklin Institute. Includes many types, which were illustrated by lantern slides or by model, and most of which are illustrated in the text.

***Smoke** prevention at Newark, N. J. 1908. (In Engineering record, v. 57, p. 72-73.)

Gives features of ordinance for smoke regulation and describes results of inspection.

***Smoke** prevention at St. Louis, Mo. 1903. (In Engineering news, v. 49, p. 134-135.)

Reviews features of municipal smoke ordinance of 1901.

***Smoke** prevention in cities; a late study of the problem at Syracuse, New York. 1907. (In Iron age, v. 80, p. 1598-1600.)

Reviews findings and recommendations of committee of Syracuse Chamber of Commerce.

***Towner, Louis C.**

City of Grand Rapids. 1913. (In Industrial world, v. 92, n. s. v. 47, pt. 1, p. 147-148.)

Brief statistics for fiscal year ending 31 March, 1912, by Chief Smoke Inspector, Grand Rapids, Mich.

***Traugott, F. C.**

Record for 1912 in Rochester, N. Y. 1913. (In Industrial world, v. 92, n. s. v. 47, pt. 1, p. 141.)

By City Smoke Inspector. Statistical summary of year's work.

***Westby, C.**

Die unschädlichmachung des hüttenrauches in den Vereinigten Staaten. Ein verfahren zur unschädlichmachung und verwertung des hüttenrauches. 1911. (In Rauch und staub, v. 1, p. 152-153.)

Wilkinson, Thomas L.

The smoke problem of Denver. 8 ill. 1903. (In Mining reporter, v. 48, p. 562-564, 591-593, 615-616.)

Compares conditions in various cities and contains much general information. Little attention to the Denver problem except to show, by analysis and description of Colorado coal, that the city has advantage of a comparatively smokeless fuel.

***Zum** rauchkrieg in den Vereinigten Staaten. 1910. (In Rauch und staub, v. 1, p. 67-68.)

Discussion of smoke and smelter fume problem in western United States. Based mainly on scattered notes in "Engineering and mining journal," 1910, v. 90, p. 309, 526, 731.

Legal Aspects in General. Unofficial Publications

***Baskerville,** Charles.

Smoke problem and the community. 1910. (In Journal of industrial and engineering chemistry, v. 2, p. 355-359.)

Opening address in symposium of American Chemical Society on "smelter fumes." Mainly a consideration of what constitutes a nuisance legally, with reference to specific cases and decisions.

***Brackenbury,** C. E.

Legal aspects of the smoke nuisance. 1909. (In Journal of gas lighting, v. 108, p. 601-605.)

Reviews rulings under common law and under statute. Suggests tax on chimneys.

***Compromise** in smelter fume suits. 1910. (In Metallurgical and chemical engineering, v. 8, p. 173.)

Editorial discussion of suits and decisions regarding the suppression of smelter fumes.

*[**Coogan,** C. E.]

Promoting smokeless combustion by law: legislation suggested as remedy for insanitary and wasteful conditions accompanying the smoke nuisance in heating boilers. 1913. (In Metal worker, plumber and steam fitter, v. 79, p. 607-608.)

Reprint of article in Salt Lake City newspaper. Deals with smoke nuisance in general, and suggests legislation for Salt Lake City.

***Corbett,** Julian S.

Law in other countries. 1912. (In Papers read at the Smoke Abatement Conferences, March . . . 1912, p. 135-139.)

Notes particularly legislation at Dresden and in various American cities and states.

***Corbett,** Julian S.

The proposed amendment of sec. 24 (sub. sec. 6) of the Public Health (London) Act, 1891. 1,700 w. 1906. (In Journal of the Royal Sanitary Institute, v. 27, p. 222.)

**The same.* 1906. (In Addresses, papers and discussions at the Conference on Smoke Abatement, p. 124-127.)

Section on smoke control. Brief comparison with laws of France, Germany and United States.

Du Mesnil, O.

Les fumées des machines à vapeur à Paris. 1890. (In Annales d'hygiène publique et de médecine légale, ser. 3, v. 24, p. 534-540.)

Concerned mainly with legislation in force at this time (1890), reviewing early ordinances in Paris and elsewhere, which have failed of enforcement.

***Flagg,** Samuel B.

City smoke ordinances and smoke abatement. 55 p. 1912. (United States—Bureau of Mines. Bulletin 49.)

***Flagg,** Samuel B.—*continued.*

**The same, condensed.* (In Engineering record, v. 67, p. 151-152.)

**The same, abstract translation.* 1913. (In Rauch und staub, v. 3, p. 187-193.)

**The same, revised.* 57 p. 1912.

Chief change in revised edition is in form of ordinance recommended for medium sized city.

The U. S. Bureau of Mines has made an extensive study of fuel consumption and attempted smoke abatement in various cities. "The most important conclusion reached is that smoke abatement by ordinance can not hope to succeed unless supported by public sentiment and that a smoke ordinance should look to future prevention rather than to immediate prohibition. In other words, strict control of furnace construction offers much greater hope for smoke abatement than desultory imposition of severe penalties on the escape of 'dense' or 'black' smoke." Preface.

Considers necessity, functions and essential features of a smoke ordinance, and discusses status of smoke abatement work in U. S., taking up separately the ordinances of 28 cities, each with a population above 200,000.

***Fletcher,** A. E.

Modern legislation in restraint of the emission of noxious gases from manufacturing operations. 1892. (In Journal of the Society of Chemical Industry, v. 11, p. 120-124.)

Considers chiefly the working of the Alkali Act and its amendments, regulating escape of hydrochloric acid gas into the atmosphere.

***Fletcher,** Herbert.

Smoke nuisance under the Alkali Acts. 1889. (In Transactions of the Sanitary Institute, v. 10, p. 301-305.)

Briefly considers difficulties in way of smoke prevention.

***Graham,** John William.

Proposed legislation. 1912. (In Papers read at the Smoke Abatement Conferences, March . . . 1912, p. 130-134.)

Considers slight changes desirable in legislation and enforcement of laws.

***Graham,** John William.

Speech by Principal J. W. Graham, M. A., explaining the Draft Parliamentary Bill. 1911. (In Proceedings of the Conference of the Smoke Abatement League of Great Britain, Manchester, 21-22 Nov., 1911, p. 24-29.)

Discussion, p. 29-33.

Preliminary draft of Smoke Prevention Act, 1912, with brief comment thereon.

Great Britain—Foreign office.

Reports on the laws in force in certain foreign countries in regard to the emission of smoke from chimneys. 29 p. 1905. (Parliament. Sessional papers, 1905.)

**The same, abstract.* 1905. (In William Nicholson's "Smoke abatement; a manual for the use of manufacturers," p. 53-101.)

The same, abstract. 1905. (In Sanitary record and journal of sanitary and municipal engineering, v. 35, p. 239-241.)

**The same, abstract by John B. C. Kershaw.* 1912. (In Metallurgical and chemical engineering, v. 10, p. 756-759.)

Reports from Austria, Bavaria, Belgium, France, Germany, Hungary, Italy, Netherlands, Saxe-Coburg and Gotha, Switzerland, United States and Württemberg.

***Hurst,** Joseph.

English law relating to the emission of smoke from chimneys. 1,500 w. 1906. (In Journal of the Royal Sanitary Institute, v. 27, p. 226.)

**The same.* 1906. (In Addresses, papers and discussions at the Conference on Smoke Abatement, p. 128-131.)

Smoke nuisance may be dealt with, under English law, as a nuisance at common law, as an offense against the national Public Health Act of 1875 or as an offense against the London Public Health Act of 1891.

***Hurst,** Joseph.

Smoke evil. Is further legislation necessary? If so, what should be its aims? 1912. (In Papers read at the Smoke Abatement Conferences, March . . . 1912, p. 125-129.)

Gives present (1912) status of English law on subject of smoke, and does not favor change of laws.

***Indictment** of railroad companies for nuisance. 1,300 w. 1898. (In Railroad gazette, v. 30, p. 815.)

Editorial comment on the indictment of the Long Island Railway Company for the smoke nuisance.

***Jurisch,** K. W.

Zwei denkschriften über luftrecht dem ausschuss des bundes der industriellen in Berlin für das studium der errichtung einer gewerblichtechnischen reichsbehörde mit benutzung der ergebnisse der vom ausschuss veranstalteten umfrage. 40 p. 1910. (Sammlung von abhandlungen über abgase und rauchschäden, no. 4.)

***Kershaw,** John B. C.

Smoke problem in large cities. 1908. (In Fortnightly review, v. 89, p. 286-299.)

Reviews regulations against smoke emission in force in France, Germany and Austria, and describes work done in Hamburg. Gives practical suggestions for combating smoke nuisance in England.

***King,** R. P.

Municipal control of smoke. 2,500 w. 1905. (In Engineering news, v. 54, p. 229.)

**The same.* 1905. (In Municipal engineering, v. 29, p. 366-369.)

The same, condensed. 1905. (In Municipal journal and engineer, v. 19, p. 158-160.)

Paper before League of American Municipalities.

Author's experience as smoke inspector of Indianapolis gives his remarks value. Gives advice on framing and enforcement of smoke ordinances, on the design and alteration of furnaces and considers briefly the classes of smoke preventing appliances. Closes with a brief review of literature on the subject.

***Knowlton,** Howard S.

New smoke law, Boston. 2 diag. 1910. (In Engineering record, v. 62, p. 150-151.)

Résumé of investigation made by Boston Chamber of Commerce, and main features of the new ordinance.

***Krause,** John W.

Smoke prevention. 1908. (In Proceedings of the Engineers' Society of Western Pennsylvania, v. 24, p. 91-120.)

Discussion.

Reviews smoke ordinances of different cities and methods of enforcement, considering especially policy followed in Cleveland.

***Leonhardt, Otto.**
Verhütung von rauch- und russbelästigungen in grösseren städten. 1,000 w. 1888. (In Glasers annalen für gewerbe und bauwesen, v. 22, p. 107-108.)

Brief mention of municipal regulations in Dresden and Berlin.

McQuillin, Eugene.
Abatement of smoke nuisance in large cities by legislative declaration that discharge of dense smoke is a nuisance per se. 1905. (In Century law journal, v. 60, p. 343-349.)

Discusses force of recent decision of Supreme Court of Missouri, sustaining act of the Missouri legislature directed against the smoke nuisance in all cities of the state having a population of 100,000 or over. Considers subject under the following heads, giving numerous citations: (1.) The legislature has plenary power to declare the discharge of smoke in populous communities a nuisance per se. (2.) Reasonableness of such legislation. (3.) Classification and discrimination. (4.) Defense where smoke cannot be abated by the application of a device. (5.) Furnace condition favorable to smoke abatement. (6.) Laws applicable to specified class of cities.

***Massnahmen** zur rauchverhütung in Davos. 1911. (In Rauch und staub, v. 2, p. 47-48.)

Mainly a reprint of law in force since 1909.

***Mock,** De Lo E.
Legal phase of the prevention of smoke and its enforcement. 7,000 w. 1908. (In Industrial world, v. 83, n. s. v. 42, p. 810.)

Paper before International Association for the Prevention of Smoke. Reviews decisions on the power and practice of municipal and other governments in the regulation of smoke.

Pieper, Carl.
Die rauchfrage. 1882. (In Gesundheits-ingenieur, v. 5, p. 96-100.)

Consideration of legal phases, briefly reviewing legislative measures of different countries.

Preventing smoke. Important judgment. 1908. (In Canadian municipal journal, v. 4, p. 221-222.)

Extracts from judgment by Police Magistrate Kingsford in city prosecution under a civic by-law which prohibited emission of black smoke for "more than six minutes in any one hour." Mainly a summary of smoke-preventive enactments of American cities. Gives also a few historical notes.

***Schädigung** eines grundbesitzers durch rauch, russ, geräusche und erschütterungen bei vornahme öffentlicher arbeiten. 250 w. 1912 (In Rauch und staub, v. 2, p. 261.)

Notice of a decision of the Oberlandesgerichts Kiel, 1912.

***Smoke** Abatement Act for Boston. 1910. (In Power and the engineer, v. 32, pt. 1, p. 738.)

Gives a few notable features of Act.

***Smoke-abatement** legislation for Boston and vicinity. 1910. (In Engineering news, v. 64, p. 182.)

Gives details of new statute passed by Massachusetts Legislature, embodying some unique features.

***Smoke** abatement legislation for Boston and vicinity. 300 w. 1910. (In Rauch und staub, v. 1, p. 25.)

Note in German on Massachusetts legislation of 15 June, 1910.

***Smoke** nuisance in its legal aspect. 1901. (In Electrical review, London, v. 49, p. 326-327.)

Reviews history of law concerning smoke from industrial works in England, with comment on its interpretation.

***Smoke nuisance in its legal aspect.** 4,200 w. 1899. (In Engineering, v. 67, p. 302.)

Summarizes British law on the subject and cites some decisions.

Smoke nuisance in Vienna. 1905. (In Municipal journal and engineer, v. 19, p. 75.)

Brief comment on existing legislation and proposed provision in new (1905?) building regulations of Vienna. Provision merely prohibits material nuisance.

***Terry, Hubert L.**

Smoke clauses of the Public Health Act. 1875. 1892. (In Transactions of the Sanitary Institute, v. 13, p. 181-184.)

Discussion, p. 184-186.

Favors leniency in enforcement against chemical and similar works, and suggests that price of smokeless atmosphere might be loss of England's commercial supremacy.

Laws and Ordinances of Special Localities.

Official Publications

Canada

Manitoba

***Winnipeg**—Council.

By-law no. 4194. A by-law for controlling the emission of smoke from chimneys and manufactories and other buildings to the inconvenience and injury of the citizens. [1 p.] n. d. Effective as soon as passed.

Incorporated with Public Health Act of Manitoba, 1911, Sec. 51-54.

Ontario

***Ontario**—Board of Railroad Commissioners.

Order no. 5678. [2 p.] 25th November, 1908.

***Hamilton**—Council of the Corporation.

By-law no. 67. To compel the prevention of smoke.

Exempts furnaces or fires used in connection with smelting or refining metals, or in construction of cement houses not exceeding three stories.

***London**—Council.

By-law no. 3451. To prevent the emission to the atmosphere of opaque or dense black smoke for a period of more than six minutes in any one hour, from any premises or steam engine in which fire is burned. [2 p.] Passed 6 December, 1909.

***Toronto**—Council of the Corporation.

By-law no. 4941, to compel the prevention of smoke. [1 p.] Passed May 13th, 1907.

Repeals By-law No. 4266, entitled "a by-law to compel manufacturers and others creating smoke to use smoke consumers."

***Toronto**—Council of the Corporation.

By-law no. 5146 to amend by-law 4941. [1 p.] Passed May 26th, 1908.

Quebec

***[Montreal.]**
By-law (no. 130) to abate nuisance by smoke. Passed 13th February, 1882. Repealed and replaced by by-law no. 260, with the exception of clause 7. p. 256-257. n. d.
Gives Sec. 7, still in force.

France

***Paris**—Préfecture de Police.
Ordonnance interdisant, dans Paris, les fumées noires, épaisses et prolongées. [1 p.] 22 June, 1898.

Great Britain

Great Britain.
Public health; a bill for consolidating and amending the acts relating to public health in England. 156 p. 1875. (55.) V, 63.
The same, as amended in Committee. 164 p. 1875. (157.) V, 239.
Touches briefly on smoke.

Great Britain—House of Commons.
Bill intituled. An act to amend the Smoke Nuisance Abatement (Metropolis) Act, 1853. 1 p. 1856. (156.) VI, 251. (30 May, 1856, 19 Vict.)
Repeals the provision whereby pottery and glass works were exempted from force of the Act of 1853. To be effective 1 Jan., 1858.

Great Britain—House of Commons.
Bill to abate the nuisance arising from the smoke of furnaces in the Metropolis and from steam vessels between London bridge and Richmond bridge. 3 p. 1852. 1852-53. (829.) VI, 367. (28 July, 1853, 16 & 17 Vict.)
The same, as amended in Committee. 3 p. 1852-53. (873.) VI, 371. (4 Aug., 1853, 16 & 17 Vict.)
Amended bill to take effect 1 Aug., 1854. Penalty within the limits specified, not to exceed five pounds nor to be less than 40 shillings, "Provided . . . that no person shall be liable to any penalty under this act . . . where coke or other fuel not emitting smoke is only used."

Great Britain—House of Commons.
Bill to abate the nuisance arising from the smoke of furnaces in the Metropolis, and from steam vessels plying to and from any places on the River Thames to the westward of Nore Light. 6 p. 1858. 1857-58. (146.) IV, 495. (17 June, 1858, 21 Vict.)
Includes all furnaces used "for purposes of trade or manufacture within the metropolis," and steam vessels as stipulated. Penalty for formation and emission of opaque smoke not less than 40 shillings nor more than five pounds. For second offense maximum is 10, and thereafter, 20 pounds.

Great Britain—House of Commons.
Bill to amend an act of the twentieth and twenty-first years of the reign of Her Majesty for the abatement of the nuisance arising from the smoke of furnaces in Scotland. 2 p. 1861. (50.) IV, 395. (27 Feb., 1861, 24 Vict.)
On and after 1 Sept., 1861, complaints for the recovery of penalties under the Act may be brought without the concourse of the Lord Advocate.

United States

California

*Los **Angeles—Council.**
Ordinance no. 21,933 (new series). An ordinance regulating the discharge of smoke, soot, ashes and cinders from flues, chimneys and smokestacks. [1 p.] Approved 23 February, 1911.

***Los Angeles**—Health Board.
Instructions for the abatement of smoke and soot nuisances. [2 p.] n. d.
Undated, but presumably for enforcement of city ordinance no. 21,933 (new series).

***Pasadena**—Council.
Ordinance no. 1055. An ordinance . . . defining nuisances and prohibiting their maintenance. [3 p.] Approved 5 November, 1910.
Sec. 3, "Smoke, dust and fumes."

Colorado

***[Denver.]**
Smoke abatement. [Ordinances?] Sections 1654-1662. [1 p.] n. d.
Imposes fine of ten to one hundred dollars for violation.

District of Columbia

***District of Columbia**—Health Department.
An act for the prevention of smoke. [1 p.] Approved 2 February, 1899.

Florida

***Jacksonville**—Council.
Bill no. K-150. An ordinance prohibiting the emission of dense smoke and cinders. [1 p.] Passed 4 April, 1911.

Georgia

***Atlanta—Committee on Ordinances and Legislation.**
An ordinance to prevent the emission of soot, black or dense smoke. [2 p.] 22 January, 1912.
Typewritten copy.

Illinois

***Chicago**—Council.
An ordinance providing for smoke inspection and abatement. [1 p. 1907.]

**The same*. 1908. (In Chicago—Department of Smoke Inspection. Bulletin 1, p. 9-12.)

***Quincy**—Council.
Ordinance no. 571. An ordinance declaring the emission of dense smoke . . . a public nuisance, and prohibiting the same. [2 p.] Adopted 14 September, 1911.
Maximum penalty $100 fine or 90 days imprisonment.

***Springfield—Council.**
An ordinance prohibiting the emission of dense smoke from smoke stacks and chimneys. [2 p.] Passed 11 June, 1911.
Typewritten copy.

Indiana

***Indianapolis—Council.**
Smoke ordinance. [4 p.] Passed 6 June, 1904.
Leaflet, giving paragraphs 272-281.

***South Bend—Common Council.**
An ordinance defining and preventing the smoke nuisance . . . prescribing penalties therefor, and providing for its publication, and repealing ordinance no. 1531, adopted 30 Dec., 1909. [2 p.] Effective 1 September, 1910.
Adopted by Council, 14 March; signed by Mayor, 15 March, 1910. Typewritten copy.

Iowa

***Cedar Rapids—Council.**
An ordinance regulating the erection and use of smoke-stacks. n. d. (In Ordinances of Cedar Rapids, Iowa, p. 237-238. Chap. 77. Sec. 731-734.)

***Davenport—Council.**
An ordinance to repeal section 1 of an ordinance entitled, "An ordinance to prohibit the discharge into the open air of dense smoke," being chapter 103 of the "Revised Ordinances of 1911." (In Council proceedings, 3 January, 1912, p. 9591-9592.)
Fixes fine at ten to one hundred dollars, each day of violation to constitute a separate offense.

***Des Moines—Council.**
Ordinance no. 1870. An ordinance declaring the emission of dense smoke . . . a public nuisance, and prohibiting the same. 7 p. Passed 6 September, 1911.

Kentucky

***Louisville—Council.**
An ordinance to prevent the emission of soot, black or dense gray smoke from smoke stacks, chimneys, and all other smoke-emitting stacks . . . including locomotive railroad engines, and engines used . . . in house and street construction work. [4 p.] Approved 27 January, 1909.
Leaflet. Ordinance in force from date of passage.

***Newport—General Council.**
An ordinance to prevent the emission of smoke, or escape of soot, black or dense gray smoke from . . . any locomotive, stationary engine, steam roller, steam derrick, steam pile driver, steam shovel, tar kettle . . . building or premises. [1 p.] Approved 10 June, 1910.
Typewritten copy.

Louisiana

***Louisiana—General Assembly.**
Smoke nuisance. Act 111 of 1898. [1 p.]

Typewritten copy.
Compels installation of smoke consumers in towns of 50,000 or more inhabitants under penalty of $25 fine or 30 days imprisonment for each day of violation. Effective from date of passage.

***New Orleans—Common Council.**
Ordinance 11,406, C. S. [1 p.] Adopted 1 October, 1895.

Typewritten copy.
Provides penalty of $25 per day for failure to install within twelve months, and properly operate appliances "to consume not less than seventy-five per centum of the smoke."

Maine

***Portland.**
City ordinances. "Certain nuisances described," p. 587, Sec. 8. "Action by person injured by nuisance," p. 592, Sec. 25.

Typewritten copy. Indefinite as regards smoke. Quotes references to state laws.

Maryland

***Baltimore—Council.**
Ordinance no. 177. 2 p. Effective 1 January, 1907.

Prohibits black or dark gray smoke for more than six minutes in an hour.

Massachusetts

Boston.

***Massachusetts**—Board of Gas and Electric Light Commissioners.
Chapter 651. Acts of 1910. An act to provide for the abatement of smoke in the city of Boston and vicinity. [6 p.] Approved 15 June, 1910.

***Springfield.**
Commonwealth of Massachusetts. Chapter 236. Acts of 1900. An act to abate the smoke nuisance in the city of Springfield. [1 p.] Approved 13 April, 1900. Effective 1 September, 1900.

Michigan

***Detroit—Board of Health.**
Smoke ordinance. An ordinance to declare the emission of dense black or gray smoke . . . shall be a nuisance per se. [6 p.] Approved 29 July, 1907. Effective immediately. Amended 20 August and 12 November, 1907.

Booklet.

**The same.* [3 p.] (Typewritten copy and clippings.)

***Grand Rapids—Common Council.**
Ordinance no. 167. An ordinance defining and preventing smoke nuisance. Passed and approved 25 April, 1898. [and] Amendment, 26 December, 1905. [and] Ordinance no. 193. An ordinance to provide for the appointment of a smoke inspector. Passed and approved 4 March, 1907. 4 p.

**The same.* [2 p. each.]

***Saginaw—Common Council.**
Ordinance no. 142. An ordinance to prohibit nuisances occasioned by dense smoke, soot, cinders and other deleterious substances or matter. [1 p.] Made, passed and adopted 26 June, 1911. Effective after six months.

Minnesota

***Minneapolis—Common Council.**
Smoke. [1 p. 1911?]

Ordinances passed 27 September, 1895 (Amending ordinance approved 16 February, 1894), 27 November, 1908, and 24 September, 1909. Sustained by Supreme Court, March, 1911.

***[St. Paul.]**
Smoke (dense). [1 p.]

Clipping giving Ordinances no. 1841, 3 October, 1895; no. 1968, approved 2 February, 1898; no. 2211, approved 10 September, 1901.

Missouri

***Missouri** "anti-smoke law." Approved 21 March, 1901. (In Smoke abatement in Saint Louis. Report to the Mayor by the Smoke Abatement Department, 1 March, 1909. [p. 9.]

Relates to cities of 100,000 inhabitants.

***Kansas City—Common Council.**
Ordinance no. 35902. An ordinance to prohibit the discharge into the open air of dense smoke. Passed 9 May, 1907. [and] Ordinance no. 36350. An ordinance to amend ordinance no. 35902. Passed 17 June, 1907. [1 p.]

Identical with "Revised Ordinances of 1910," Sec. 264.

***St. Louis—Municipal Assembly.**
Ordinance 20583. Approved 12 March, 1902. (In Smoke abatement in Saint Louis. Report to the Mayor by the Smoke Abatement Department, 1 March, 1909. [p. 10-12.]

**See also* "Sections in new ordinance (n. d.) relating to smoke abatement." [3 p.] (Typewritten copy.)

Nebraska

***Lincoln—Council.**
An ordinance declaring the emission of dense or otherwise offensive smoke or odors from any chimney . . . a nuisance. [1 p.] n. d.

Typewritten copy.

***Omaha.**
[Ordinance regulating the smoke nuisance. 1 p.] n. d.

Typewritten copy.

New Jersey

***Atlantic City—Council.**
Ordinance no. 83, relating to and regulating the emission of dense smoke containing soot from chimneys and smoke-stacks. [1 p.] Passed 10 September, 1906.

***Jersey City**—Board of Health.
An ordinance to abate all nuisances arising or resulting from the escape or discharge of dense smoke, dust, gas and cinders from any stack connected with any engine or locomotive. [1 p.] n. d.
Typewritten copy.

***Newark—Common Council.**
Smoke ordinance. [8 p.] Passed 2 April, 1908.

***Passaic**—Board of Health.
Sanitary code. 70 p. 1904.
No definite provision regarding smoke. Sec. 58, (p. 35-36) prohibits objectionable trades "attended by noisome and offensive odors" without permit from the Board.

***Paterson—Board** of Aldermen.
An ordinance to prevent the emission or discharge of dense smoke. [2 p.] Passed 5 February, 1906.
Typewritten copy.

New York

***Brooklyn.**
Sanitary ordinances. Sec. 181. [1 p.] n. d.
Typewritten copy.

***Buffalo**—Common Council.
Smoke ordinance. [City ordinance, chapter 42.] 7 p. n. d.
Published by Department of Public Works.

***New York City**—Board of Health.
Sanitary code of the Board of Health of the Department of Health. 126 p. 1912.
"Smoke." Sec. 181, p. 86.

***Niagara Falls.**
Smoke ordinance. [Ordinances] chapter 21. [1 p.] Adopted 27 July, 1908. Effective 1 August, 1908.
[Recommended amendment to chapter 21. 2 p.]
Typewritten copy.

***Poughkeepsie**—Common Council.
Ordinance to prevent smoke. Sec. L. [1 p. Effective 15 June, 1912.]
Typewritten copy.

***Rochester**—Common Council.
Smoke ordinance. [7 p. 1906?] Effective 1 June, 1906.
Published by Department of Public Safety.

***Schenectady**—Common Council.
Ordinance. [1 p.] n. d.
Amending ordinance adopted 10 July, 1911.

***Syracuse**—City clerk, *comp.*
Ordinances of the city of Syracuse as amended 1 July, 1907. 62 p.
"Railroads and steamboats." Chap. 27, Sec. 6.

***Utica.**
[Ordinance?] 167. Sec. 1-2. [1 p.] n. d.
Typewritten copy.

***Yonkers.**
Smoke, gases, etc. [Ordinance?] Sec. 89. [1 p.] n. d.
Typewritten copy.

Ohio

***Akron.**
Revised ordinances. Sec. 108. [1 p.] 1908.
Typewritten copy.

***Cincinnati**—Council.
An ordinance no. 141. 1912, providing that smoke of a greater degree of darkness than no. 1 scale shall be dense smoke, by amending section 310 of the Code of Ordinances. Passed 5 March, 1912, [and] An ordinance no. 202. 1912, amending section 308-4 of the Code of Ordinances. Passed 16 April, 1912. [1 p.]

***Cincinnati**—Council.
An ordinance to regulate the emission of smoke . . . [1 p.] Passed 30 December, 1907. Approved 3 January, 1908.
Repeals Section 4 of Ordinance no. 1889.

***Cleveland**—Council.
Ordinance no. 23641. [8 p.] Passed 29 January, 1912.
Supplements Section 198 of revised ordinances of 1907, and repeals certain other sections.

***Columbus**—Council.
An ordinance providing for the inspection, regulation and abatement of smoke . . . [7 p. 1913.]
Typewritten copy.

***Toledo**—Council.
An ordinance regulating the use of soft and bituminous coal. 1 p. Passed 16 October, 1911.
Post card notification form.

***Toledo**—Council.
An ordinance to prevent the emission of dense black or gray smoke . . . Sec. 1010-1018. 7 p. n. d.
Binder's title reads "Smoke ordinance."

Pennsylvania

***Philadelphia—Councils.**
An ordinance to regulate the emission of smoke. [3 p.] Approved 9 December, 1904. Amended 3 April, 1906.
Published by Department of Public Safety. Bureau of Steam Engine and Boiler Inspection.

***Pittsburgh**—Council.
Ordinance no. 205, ser. 1911. An ordinance providing for the regulation of the production or emission of smoke within the corporate limits of the City of Pittsburgh, and prescribing penalties for violation thereof. [4 p.] Enacted 19 September, 1911.

***Reading—Select and Common** Council.
S[elect] C[ouncil] bill no. 68. An ordinance to prevent the emission of dense black or gray smoke from smokestacks, chimneys, locomotive engines, and all other smoke-emitting stacks. 6 p. Read 13 November, 1905.

Rhode Island

***Rhode Island—General Assembly.**
An act to define and prevent nuisances caused by smoke. [1 p.] Effective 1 January, 1903.

**The same.* [2 p.] (Clippings.)

***Rhode Island**—General Assembly.

An act to provide for the abatement of smoke in cities of twenty thousand or more inhabitants. January session, 1912, chap. 807. 7 p. Approved 23 April, 1912.

**The same.* 10 p. 1912.

***Providence**—Council.

An ordinance accepting the provisions of chap. 807 of the public laws . . . and establishing a Department of Smoke Inspection. 2 p. Approved 8 November, 1912. (In Resolutions of the City of Providence, 1912? Chap. 538, p. 446-447.)

Tennessee

***Memphis**—Board of Commissioners.

An ordinance to prohibit the emission of dense black or gray smoke. [4 p.] n. d.

Texas

***Houston**—Council.

An ordinance prohibiting persons or corporations, the flues of whose houses or establishments emit smoke which blows upon or against higher buildings adjacent thereto so as to disturb or diminish the ordinary comfort or convenience of living of the inmates or occupants of said higher building, from continuing to burn or use soft coal . . . unless such person . . . maintains some device or apparatus which successfully consumes the smoke. [1 p.] Passed and approved 20 December, 1909.

Typewritten copy.

Utah

***Salt Lake City**—Council.

An ordinance declaring the emission of thick, black or gray smoke, or cinders . . . a public nuisance. [1 p.] Passed 10 December, 1906.

Virginia

***Richmond.**

City code. Chapter 26. [1 p.] n. d.

Typewritten copy.

Washington

***Seattle**—Council.

Ordinance no. 5503. An ordinance relating to smoke from chimneys or smokestacks. [1 p.] Passed August, 1899. Effective 20 September, 1899.

Typewritten copy.
Repealed by Ordinance no. 12001.

***Spokane**—Council.

Ordinance no. A-1213. An ordinance to provide for the protection of persons and property from soot, smoke or fire. [1 p.] Passed 19 August, 1902. Effective ten days after passage.

Typewritten copy.

Wisconsin

***La Crosse**—Common Council.

Ordinance no. 415. An ordinance to prohibit the emission of dense smoke from the smokestack of any boat, locomotive or from any chimney. [2 p.] Published 26 January, 1905. Effective immediately.

Typewritten copy.

***Milwaukee**—Council.

Ordinance no. 93. An ordinance to amend chapter 21 of the General Ordinances . . . passed 28 May, 1906. 11 p. Passed 9 October, 1911.

Binders title reads "Chapter 21 of the General Ordinances . . . as amended October 9, 1911, relating to the suppression of smoke."

***Superior.**

[Smoke ordinance. 1 p.] Passed 10 April, 1912.

Typewritten copy.
Fine of one to fifty dollars for each violation.

Publications of the Smoke Investigation

Bulletin No. 1. Outline of the Smoke Investigation. 16 p. Free.

Bulletin No. 2. Bibliography of Smoke and Smoke Prevention. 164 p. Fifty cents.

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